Computer Horizons

Book 8

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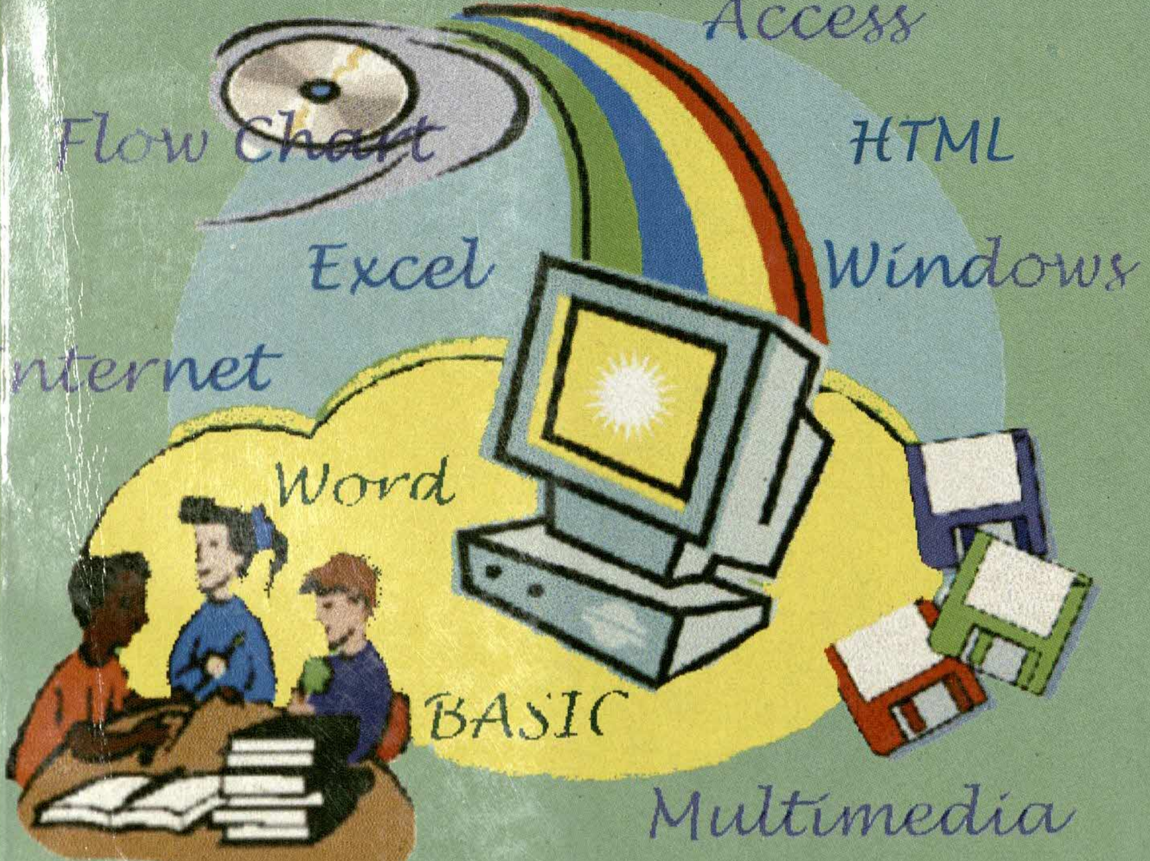

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Computer Horizons

Book - 8

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PREFACE

Computers have been cloaked in mystery since their invention. This book is aimed at clearing away some of the mystery and proving that you can use a computer. Remember, a computer is just an electronic machine which can perform calculations at high speeds. However, a computer can only do what it is told to do and you will be learning how to command one. Do not worry about mistakes, they cannot hurt the computer.

This book harps into the Fundamentals of Computer, Algorithms –Flow Charting and Programming, Programming with BASIC (including arrays), Word Processing, Excel and Introduces Database through Access and goes into Multimedia operations and Internet.

This book has been designed for use at a computer terminal, so you can try the exercise which follow the concepts as they are presented. Each section of the book introduces a new idea, and ends with a simple exercise or two, which you should try before progressing. You can thus progress at your own pace.

Although, this book is meant for pupils of class VIII, as a follow up of the text written for class VII, it could also be treated as an independent text, and general readers will also find it useful.

Happy Computing !

Subhashish Addy

Second Edition, 2007

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Chapter : 1

Computer Fundamentals

We will learn about

- **System of Numeration**
- **Binary State**
- **Binary Codes**
- **Binary Number System**
- **Binary Arithmetic**
- **Definition of the Computer**
- **Parts of the Computer : ALU, Control Unit, Primary Storage Unit**
- **Types of Computer Memory**
- **INPUT and OUTPUT Devices**
- **Secondary Storage Devices**
- **Generations of Computer**
- **Classification of Computers**
- **Computer Languages**
- **MS-DOS Operating System**

1.1 System of Numeration

The history of computers can be traced back to the efforts of the early man to count large numbers, say, numbers greater than 100! Initially man started counting in groups of 2s, 4s, 5s, 10s, 20s etc. It is the counting of large numbers that required the need to develop various systems of numeration. Even characters , symbols or numerals were developed to signify different numbers. The character had a variety of forms in different civilizations, and also got considerably modified in the course of time. To summarize, the ancient Egyptian priests some 4500 years ago (around 2500 B.C) were probably the first to develop characters, while writing numbers using papyrus.

Babylonian System of Numeration

About 2500 B.C.in the region of Mesopotamia, that is the combined region of the present day Baghdad in southern Iraq to the Persian Gulf, was founded by the Babylonian civilization, They formed among other things the Babylonian calendar, based upon the twelve complete cycles (or months) of the phases of the Moon. This so-called lunar year was later replaced by the present day solar year (or the year of the seasons).

The Babylonian system of numeration used as a base-of-60, i.e., a basic set of 60 numerals; numbers greater than 60 being given in terms of basic 60 numerals. It is similar to the present day base-of-10 system, which invokes 10 basic numerals from 0 to 9.

The Babylonian system of numeration is also called the sexagesimal system. In the Babylonian system of numeration the numerals were of cuneiforms or wedge-shaped. Some of the Babylonian numbers, equivalent to decimal numbers from 1 to 60, are presented in the below mentioned table

Equivalence of some of Babylonian numbers and decimal numbers from 1 to 60

Decimal numbers	**Babylonian numbers**
1	▽
2	▽ ▽
3	▽ ▽ ▽
4	▽ ▽ ▽ ▽
5	▽ ▽ ▽ ▽ ▽
9	▽ ▽ ▽ ▽ ▽ ▽ ▽ ▽ ▽
10	◁
60	◁ ◁ ◁ ◁ ◁ ◁

Greek System of Numeration

Around 3 B.C (say around 2000 years ago), the Greek alphabet was being used as numerals. Some of the Greek numbers equivalent to decimal numbers from 1 to 10 as shown in the table below.

Equivalence of some of Ancient Greek numbers and decimal numbers from 1 to10

<table>
<tr><th>Decimal numbers</th><th>Greek numbers</th></tr>
<tr><td>1</td><td>|</td></tr>
<tr><td>2</td><td>||</td></tr>
<tr><td>3</td><td>|||</td></tr>
<tr><td>4</td><td>||||</td></tr>
<tr><td>5</td><td>|||||</td></tr>
<tr><td>10</td><td>△</td></tr>
</table>

Roman system of Numeration

Latin or Roman had taken over Greek language about 1000 B.C. (about 3000 years ago) in countries around the Mediterranean forming the Western Roman Empire.

The rules for forming larger Roman numbers are the following:

(i) if a smaller numeral comes before a large numeral, they are subtracted. For instance, IX equals 9.[A number of the type IIX cannot be formed.]

(ii) If a larger numeral comes before a smaller numeral, they are added. For instance, XI equals to 11 and XII equals to 12.

The Roman system of numeration uses the base-of-7, i.e. I, V, X, L, C, D and M, for writing numbers. It is perhaps the only system that is still in use in the modern times. For instance, chapter numbers in a book are still fancied to be written using the Roman numerals. Some people while putting dates like to put the number of the month in Roman numerals.

Equivalence of some of Roman numbers and Decimal numbers from 1 to 1000

Decimal numbers	Roman numbers
1	I
2	II
3	III
4	IV
5	V
9	IX
10	X
11	XI
50	L
100	C
500	D
1000	M

Indian Base-of-10 System of Numeration

Everyone is familiar with the sequence of numerals: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9
The ancient base-of-10 system from India forms the basis of the modern decimal system of numeration. While dealing with fractions the unit '1' is divided into ten equal parts, forming the 'tenths'. Each 'tenth' is sub-divided further into 10 equal parts, forming 'hundredths', and so on.

1.2 Binary State

In a computer, storage and processing units are made up of a set of silicon chips, each of them containing large numbers of transistors which act like switches. We can imagine the memory to be like a rectangular array of switches. Each switch can either be ON or OFF at any instant. This means that switches constitute a memory that is a two state device , ON (1) and OFF (0) being the two possible states.

We may thus view a switch as the smallest unit capable of storing a 0 or 1. Such a two stage switch is also known as binary switch because it represents any one of the two binary digits 0 or 1. These two digits 0 and 1 are known as **bits** and due to this name a switch in the memory is also known as a BIT (Note: the word **Bit** is an abbreviated form of **B**inary Dig**it**)

The computer does not understand anything other than 0 and 1.

0	0	1	1	0	1	0	1
OFF	OFF	ON	ON	OFF	ON	OFF	ON

The memory shown in the above figure has 8 switches in a row. Each switch may be either 1 (ON) or 0 (OFF) actually representing the presence or absence of electric pulses respectively. At any instant of time, a particular row of switches may represent the above pattern.

Such a pattern is known as bit pattern. In this example, the leftmost switch or Switch 1 is OFF, representing 0, Switch 2 is also OFF, Switch 3 is ON representing a 1 and so on.

Each row of switches, represents a fixed number of bits, known as a **word**. The number of bits in a word is taken as the word size or word length. In our example of memory, the word size is 8 bits.

1.3 Binary Codes

All the characters have been coded for the sake of easy exchange of information between the different systems. ASCII (American Standard Code for Information Interchange) Code specifies all the lower and upper case letters, numbers, punctuation symbols and also special control commands. As the system uses 8 bits to code each character a maximum of 256 character can be coded.

For example, the ASCII code for "A" =65 when "A" is pressed, the binary equivalent of 65 i.e. 1000001 is transmitted as pulses.

1.4 Binary number system

The binary system uses only two digits 0 and 1. These two digits are called **B**inary dig**its** or simply **Bits**. The system is also often referred to as a base two (2) system.

We have seen that in the decimal system, each digit has a face value and a place value. The same rule applies to the binary system. The face value is either 0 or 1 as there are only two digits in this system. The place value is the appropriate power of 2. In the decimal system we refer to the place values as units, tens, hundreds, thousands, etc. i.e. 10^0, 10^1, 10^2, etc. Similarly the place values in the binary system are 2^0,2^1,2^2,2^3 etc.

Consider a binary number 1100. This is a four bit number. The extreme left bit (in this case "1") is called the **M**ost **S**ignificant **B**it (MSB) and the extreme right bit (in this case "0") is called the **L**east **S**ignificant **B**it (LSB)

The extreme left bit (MSB) signifies	$1 \times 2^3 = 8$
The second bit signifies	$1 \times 2^2 = 4$
The third bit signifies	$0 \times 2^1 = 0$
The extreme right bit (LSB) signifies	$0 \times 2^0 = 0$

That is,12 is the decimal equivalent of 1100.

Let us take another example:

$$
\begin{aligned}
(111011)_2 &= 1 \times 2^5 + 1 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^0 \\
&= 32 + 16 + 8 + 0 + 2 + 1 \\
&= (59)_{10}
\end{aligned}
$$

Conversion from Decimal to Binary for integers

To convert a decimal number to its binary equivalent, divide the decimal numeral and the successive quotients by 2. The successive remainders (which can be only 0 and 1), written in the reverse order, form the equivalent binary numeral.

Let us see two examples of converting decimal numerals$(12)_{10}$ and $(131)_{10}$ to their binary equivalent:

………………….▶

Example i .

		Remainder	
2	12		
2	6	0	(LSB)
2	3	0	
2	1	1	
	0	1	(MSB)

So $(12)_{10} = (1100)_2$

Example i i.

		Remainder	
2	131		
2	65	1	(LSB)
2	32	1	
2	16	0	
2	8	0	
2	4	0	
2	2	0	
2	1	0	
	0	1	(MSB)

So $(131)_{10} = (10000011)_2$

Conversion from binary to decimal fractions

In the decimal numeral 6.25, 6 is the integral part and 0.25 is the fractional part. Each position in the fractional part represents a negative power of 10.

For e.g.

$0.25 = 2/10 + 5/100 = 2\times10^{-1} + 5 \times 10^{-2}$

Again

$213.175 = 2\times10^{2}+1\times10^{1}+3\times10^{0}+1\times10^{-1}+7\times10^{-2}+5\times10^{-3}$

Similarly, in the binary number 101.11, 101 is the integral part and 11 is the fractional part. To get the decimal equivalent ,we expand using the appropriate power of 2. Let us see two examples:

$$
\begin{aligned}
(101.11)_2 &= 1\times2^{2}+0\times2^{1}+1\times2^{0}+1\times2^{-1}+1\times2^{-2}\\
&= 4 + 0 + 1 + 1/2 + 1/4\\
&=5+3/4\\
&=(5.75)_{10}
\end{aligned}
$$

$$
\begin{aligned}
(101.101)_2 &= 1\times2^{2}+1\times2^{1}+1\times2^{0}+1\times2^{-1}+0\times2^{-2}+ 1\times2^{-3}\\
&= 4 + 2 +1 + 1/2 + 0 + 1/8\\
&= 7 + 5/8\\
&= (7.625)_{10}
\end{aligned}
$$

Conversion from Decimal to Binary fractions

To find the binary equivalent of a decimal fraction, multiply it successively by 2.The procedure is just the reverse of converting decimal whole numbers to binary, i.e. we multiply by 2 instead of dividing and keep track of overflow instead of the remainders.

Let us see two examples of converting $(0.625)_{10}$ and $(0.2)_{10}$ to their binary equivalents:

	Integral Part	Binary Position
$0.625 \times 2 = 1.250$	1	1×2^{-1}
$0.250 \times 2 = 0.500$	0	0×2^{-2}
$0.500 \times 2 = 1.000$	1	1×2^{-3}

Therefore $(0.625)_{10} = (0.101)_2$
Converting $(0.2)_{10}$ into its Binary equivalent

$0.2 \times 2 = 0.4$ 0
$0.4 \times 2 = 0.8$ 0
$0.8 \times 2 = 1.6$ 1
$0.6 \times 2 = 1.2$ 1
$0.2 \times 2 = 0.4$ 0
$0.4 \times 2 = 0.8$ 0

As you will observe, the binary digits begin to repeat or recur.
Therefore, $(0.2)_{10} = (0.00110011\ldots.)_2 = (0.0011)_2$

1.5 Binary Arithmetic

Four basic arithmetic operations of additions, subtractions, multiplication and division are also applicable to binary numbers. The subject of arithmetic operations on binary numbers is called binary arithmetic. The binary arithmetic operations are similar to the familiar decimal arithmetic operations.

Binary Addition

The method for the addition of binary numbers is similar to the one by which decimal numbers are added. The binary numbers are placed one below the other in such a manner that the digits of the same place values fall in the same columns. Then one starts adding from the rightmost digit to the leftmost digit. The four rules on the addition of binary digits 0 and 1 are applicable.

$0 + 0 = 0$ [i]
$0 + 1 = 1$ [ii]
$1 + 0 = 1$ [iii]
$1 + 1 = 10$ [iv]
$= 0$, with a carry of 1

Rules [i] to [iii] are simple additions of digits 0 and 1. Rule [iv] makes use of $1 + 1 = 2$.i.e.whereas the addition of $1 + 1$ in the binary system is 10, (pronounced as one zero and not ten) .Thus 10 is the binary equivalent of 2 in the decimal system.

Examples

1. Add 100001 with 100000

$$\begin{array}{r l} 100001 & [33] \\ \underline{+\ 100000} & [32] \\ 1000001 & [65] \end{array}$$

2. Add 1010 and 1111

$$\begin{array}{rl} 1010 & [10] \\ \underline{+1111} & [15] \\ 11001 & [25] \end{array}$$

Here, there are carries from the 2nd, 3rd and 4th bit positions.

Binary Subtraction

The method by which binary numbers are subtracted is also similar to the one by which decimal numbers are subtracted. Once again the binary numbers are placed one below the other in such a manner that the digits of the same place values fall in the same columns. Then one starts subtracting from the rightmost digit to the leftmost digit. The following four rules on the subtraction of binary digits 1 and 0 are applicable:

0 – 0 = 0 [i]
1 – 0 = 1 [ii]
1 – 1 = 0 [iii]
0 – 1 = 10 – 1, [iv]
=1, with a borrow of 1

Rules [i] to [iii] are simple subtraction of digits 1 and 0. Rule [iv] makes use of the subtraction of 10 – 1 = 1 with a borrow of 1. It is required that 1 be borrowed from the next column on the left.

Examples:

1. Subtract 1100 from 10101111

$$\begin{array}{r} 10101111 \\ \underline{-1100} \\ 10100011 \end{array}$$

Note that in the example above, there is no borrowing.

2.Subtract 1111 from 10000

$$\begin{array}{r} 10000 \\ \underline{-1111} \\ 0001 \end{array}$$

Binary Multiplication

The method for the multiplication of binary numbers is again similar to the one by which decimal numbers are multiplied. The following four rules on the multiplication of binary digits are as follows:

0 x 0 = 0 [i]
0 x 1 = 0 [ii]
1 x 0 = 0 [iii]
1 x 1 = 1 [iv]

As an example, let it be required to multiply binary integers 10101 and 100, which are equivalent to decimal integers 21 and 4, respectively, as per the rules of binary multiplication and addition

```
      10101
       x100
    _______
      00000
     00000
    10101
   ________
   1010100
```

Binary integer 1010100, equivalent to decimal integer 84, is the required result of multiplication.

Binary Division

The method for the division of binary numbers is similar to the one by which decimal numbers are divided.

The rules of binary division are

A	B	A/B
0	1	0
1	1	1

As an example, let it be required to make the division of binary integer 1010100 by binary integer 100, which are equivalent to decimal integers 84 and 4, as per the method of division and subtraction:

```
100 )  1010100 ( 10101
       100
         101
         100
           100
           100
```

Binary integer 10101, equivalent to decimal integer 21, is the required quotient or result of division.

Complement

For a number which has "m" digits, a complement is the difference between the number and the base raised to the m^{th} power minus one.

For example, say 101 is a binary number. Here the number of digits is 3 and base is 2 (as 101 is a binary number). So the complement of 101 is :

$2^3 - 1 - 101$
$= 1000 - 1 - 101$
$= 111 - 101$
$= 010$

In case of binary numbers **'complement'** generally implies **'one's complement'**.

To get the two's complement of a binary number we add 1 with its one's complement. It is equivalent to the difference between the number and the base raised to the m^{th} power.

So, two's complement of 101 is 010+1=011
or equivalently, 1000–101=0011

In binary subtraction, especially where the borrow comes, it is convenient to use the two's complement from the number which is to be subtracted. For example, suppose we want to subtract 0011 from 1010. Firstly, we change 0011 to its two's complement form,

10000–1–0011+1=1111–0011+1=1100+1=1101

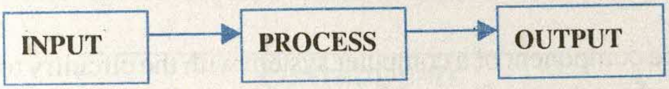
then add this with 1010

1010+1101=0111(5^{th} digit is truncated)

So, we can conclude, that complement negates a binary number.

1.6 Definition of the Computer

A computer is an electronic device that receives, stores and processes data according to a given set of instructions. The data and the instructions, which tell the computer what to do with the data, are given (**input**) to the computer. The data and the instructions are placed (**stored**) in the computer till needed. The computer then works on (**processes**) the data according to the instructions to produce information (**output**). Any computer activity consists of the following sequence:



The term **data** is the name given to basic facts like numbers, alphabet, names, addresses, quantities, profit, loss etc. Data processing consists of collecting, organising and manipulating data into a more meaningful form called **information**. For example list of names, receipts, bills etc. Sometimes information may be processed further to produce new information. The instructions given to a computer to carry out the processing of the data is called a **Program**.

1.7 Parts of the Computer

Input Device

Before computer processing, data must be entered into the computer by an input device so that they can be translated into a machine-readable form. Let us have a look at various input devices available.

Keyboard

Standard keyboard is the most common and familiar input device. The traditional QWERTY typewriter comprises the basic portion of today's computer keyboard. A typical computer keyboard contains all letters, numbers, and symbols of a regular typewriter, plus other keys which may include:

(i) a numeric keypad which functions like calculator

(ii) function keys whose operation can be determined by the user or pre-programmed by the software being used.

(iii) Special keys such as those used to control movement of the cursor (special character or symbol that indicates the user's position on the screen or focuses attention to a specific area, to allow communication and interaction between the user and the program) on the computer screen.

Mouse

A mouse is a pointing device. It usually contains two or three buttons; as the user rolls it on a flat surface, the mouse controls cursor movements on the screen. When the user presses one of the buttons, the mouse either makes a place on the screen or makes selections from data on the screen. It can be used for many applications ranging from games to designing products with graphics. It can be used as an alternative to keyboard in certain operations or it can be used in combination with a keyboard to enhance input operations.

CPU:CPU is the component of a computer system with the circuitry to control the interpretation and execution of instructions. It performs the process part of INPUT-PROCESS-OUTPUT cycle.

In a microcomputer, the components of the CPU are mounted on the main circuit board, called the "**Motherboard**".
A microprocessor chip contains the circuits and special storage locations called registers needed to perform the arithmetic-logic and control functions.

The various components on the main circuit board of the personal computer processor unit are linked together by sets of parallel electrical conducting lines called **Buses**.

Components of CPU:

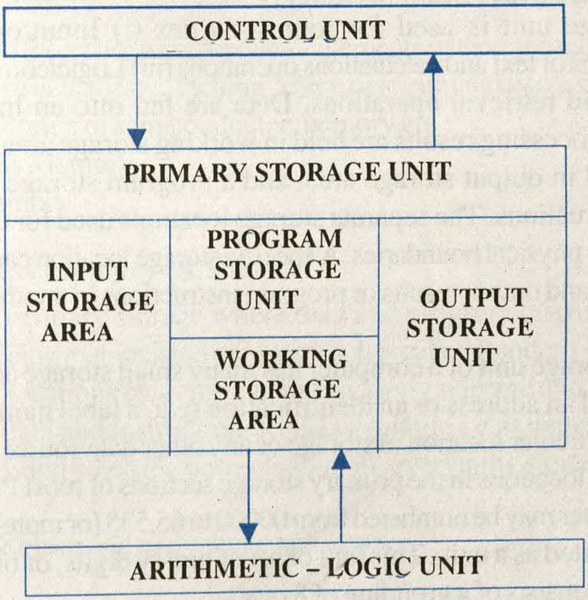
The various components of a Central Processing Unit are:

1. Arithmetic and Logic Unit (ALU)
2. Control Unit
3. Primary Storage Unit

Arithmetic and Logic Unit (ALU)

ALU is that part of CPU where the actual data processing occurs. All calculations (mathematical) and all comparisons (logic function) take place in this unit.

Every arithmetic step requires at least two numbers and then it produces a result. Multiplication, for example, uses a multiplicand and a multiplier to get a product. Although every ALU must be able to manage the two data words and the result, different processing and storage techniques are used, in different models.



In addition to arithmetic functions, the ALU also performs logical functions. Logical function is one where numbers or conditions are compared to each other. Circuits in the ALU are generally used to compare two numbers by subtracting one with the other.

The sign (negative or positive) and the value of the difference tell the processor that the first number is equal to, less than, or greater than the second number. Alphabetic data may also be compared according to an assigned order sequence.

Control Unit:

The control unit interprets the instruction it receives from memory and directs the sequence of events necessary to execute the instruction. Control Unit uses a system clock, which synchronises all tasks by sending out electrical pulses. Clock speed (the number of pulses or clocks per second) is measured in megahertz (MHz) and is the main element in determining the speed of the processor. Computer speed is also measured by the number of instructions completed per second, or Millions of Instructions Per Second (MIPS).

Primary Storage Unit (Main Memory)

Primary storage unit is used for four activities (i) Input/output operations, (ii)Manipulations of text and calculations operations (iii) Logic/comparison operations (iv) Storage and retrieval operations. Data are fed into an input storage area; Intermediate processing results are held in working storage area; Final processing results are held in output storage area, and a program storage area contains the processing instructions. The separate storage locations used for these four tasks do not have built-in physical boundaries. A specific storage location can hold input data in one application and output results or program instructions in another.

The primary storage unit of a computer has many small storage areas. Each storage area is assigned an address or an identification (e.g. a label name or number) that designates a particular location in storage or any other data source. There are 65,536 or more storage locations in the primary storage sections of most PCs. The address in one such computer may be numbered from 00000 to 65,535 (or more). The combination of 0 and 1 is treated as a unit . This unit or set of binary digits, or bits is called a byte. A typical byte consists of a grouping of 8 bits.

Primary Storage may take one of the three forms:

(i) Magnetic Core Memory
(ii) Semiconductor Memory
(iii) Bubble Memory

Types of Computer Memory

Magnetic Core Memory

Magnetic core memory consists of small magnetic cores with wires running through them. Electric current flows through the wires and depending on the direction of the current flow, electricity magnetises the core in different directions. The direction of magnetisation indicates certain data representation to the CPU. However, since this form of memory is bulky, it has given way to newer technologies, such as semiconductor memories.

Semiconductor Memory

All computers made today use semiconductor elements in their primary storage units. This type of memory is made by "etching" electronic circuits onto a silicon chip. The two most common forms of semiconductor memory are :

A. Random Access Memory
B. Read-Only Memory

A. Random Access Memory (RAM)

This is the part of primary storage where data and program instructions are held temporarily while being manipulated or executed. It is called Random Access Memory because any of the locations on a chip can be randomly selected and used to directly store and retrieve data and instruction. RAM is volatile i.e. it depends on a steady supply of electricity and when the power is shut off, everything stored is lost.

RAM chips may be classified as dynamic and static.

Dynamic RAM chip: The storage cell circuits in dynamic RAM chips contain:

1. a transistor that acts like a mechanical on-off light switch.
2. a capacitor that is capable of storing an electric charge.

Depending on the switching action of the transistor, the capacitor either contains no charge (0 bit) or holds a charge (1bit). The charge on the capacitor tends to "leak off", therefore, provision is made to "regenerate" the storage charge. Thus a dynamic RAM chip provides volatile storage.

Static RAM Chip: It also provides volatile storage, but as it is supplied with power, it needs no special generator circuits to retain the stored data. Static RAM chips are more complicated and take up more space than dynamic RAM chips because they require more transistors and other devices to store a bit of data. Therefore, static RAMs are used in specialised storage section.

Every processor has a primary storage section (general purpose storage section) that holds the active programs, and data which are being processed. In addition to this, many processors also have built-in specialised storage elements that are used for specific processing and control purposes. One element used during processing operations is a high speed **buffer memory** known as **cache memory** which is both fast and expensive per character stored, as compared to primary storage.
This high speed circuitry serves as a " scratch pad" to temporarily store data and instructions that are likely to be retrieved many times during processing, thereby improving the processing speed. Data may be transferred automatically between the buffer and primary storage. Cache memory is used in large as well as small computers.

B. Read Only Memory

Read **O**nly **M**emory i.e. **ROM** chip retains the stored data even when the power supply is shut off. So, unlike RAM chips, ROM chips are non-volatile. ROM chip may contain micro program control instructions that causes the machine to perform certain operations such as, starting the computer or instructions to the operating system.

ROM chip can only be read, it does not accept any input data or instructions from the users. The actual contents of ROM are set by the manufacturers and they are unchangeable and permanent. ROM is mainly of three types:

i. **P**rogrammable **R**ead **O**nly **M**emory (**PROM**) allows a chip to be programmed by the user for converting critical and lengthy operations into microprograms that are fused into a chip. Once, they are in a hardware form, they can be executed at a very high speed. Once operations have been written into a PROM chip, they cannot be altered.

ii. **E**rasable **P**rogrammable **R**ead **O**nly **M**emory (**EPROM**) can be erased and reprogrammed. It needs to be removed from the processor and exposed to ultraviolet light for some time before it can accept any new contents.

iii. **E**lectrically **E**rasable and **P**rogrammable **R**ead **O**nly **M**emory (**EEPROM**) can be reprogrammed with special electrical pulses.

Bubble Memory :

Bubble Memory is non-volatile, but it is not widely used as a semiconductor memory because it is slower and more expensive. Bubble memory is built on a thin piece of the mineral garnet where certain sections are polarised to produce bubble-like areas. Data are represented by the presence or absence of these bubbles.

Output Device:

An output device is a peripheral device that allows a computer to communicate information to humans or another machine by accepting data from the computer and transforming them into a user readable form.

Output that can be understood by humans can be in the form of

1. Hard Copy
2. Soft Copy

Hard Copy

It is the output on the paper from a printer and can be read immediately or stored and read later. This is relatively stable and permanent form of output.

Soft Copy

It is usually the output displayed on the screen . It is a transient form of output and is lost when the computer is turned off.

Output Devices:

Hard copy devices can be broadly grouped into two categories:

A. Printer
B. Plotter

A. Printer

A printer produces output in the from of text, on paper.

Types of Printers:

It uses printer heads containing nine to twenty four pins. These pins produce patterns of dots on the paper to form the individual characters.

Dot Matrix printers are very popular, as they are relatively inexpensive and typically print at speed of 100-600 characters per second. These printers can give us draft quality, standard quality and near letter quality prints.

Daisy Wheel Printer

This printer is used in order to get the quality of type found on typewriters. The daisy wheel printer is so called because the print mechanism looks like a daisy. The printer gives us letter-quality print but are slow, typically 25-55 characters per second.

Line Printer

Line printers, or line-at-a-time printers use special mechanisms mentioned above that can print a whole line at once. They are very fast with speed ranging from 1200 to 6000 lines per minute.

Ink-Jet Printers

Ink-Jet printers form characters on paper by spraying ink from tiny nozzles through an electrical field and arranges ink particles into character at the rate of approximately 300-1200 d.p.i. (dots per inch). The ink is absorbed into the paper and dries instantly. Various colours of ink can also be used. The printing speed on paper is measured by PPM or Pages Per Minute.

Ink-jet printers are reliable,and have recently gathered popularity in office use where good printing quality is required. The cost of cartridges being high, the running cost becomes much higher than Dot Matrix Printer.

Laser Printer

To obtain an excellent quality printing comparable to a typeset material and cost is no factor, a laser printer is the solution. They produce images on paper by directing a laser beam at a mirror, which bounces the beam on to a drum. The laser leaves a negative charge on the drum to which positively charged black toner powder will stick. As the paper rolls by the drum, the toner is transferred to the paper. A hot roller bonds the toner to the paper. Laser printers use buffers to store an entire page at a time and that is why they print very fast at a rate higher than 20,000 lines or 500 pages per minute.

B.Plotter

A plotter reproduces drawings using pens that are attached to movable arms. The pens are directed across the surface of a stationary piece of paper. High quality bar graphs, pie charts created with a plotter give a very good quality output.

Soft Copy Devices

An output on softcopy devices enables viewing of the work, which allows corrections or rearrangement of material to suit specific jobs. Various terminals or video display units are examples of Soft Copy devices.

Visual Display Terminal

A monitor is a television like device used to display data or information, allowing users to view the results of processing. The combination of monitors with the keyboard is called the terminal. Computer industry has divided VDT offerings into three catagories.

Dumb Terminal

The Dumb Terminal is a stand alone keyboard and display screen that can send or receive data, but cannot process that data. They are simple devices that immediately transmit each keyed data character to the processor.

Smart Terminal

They are designed with a microprocessor chip that contains the circuits needed to perform arithmetic logic and control functions and they also have an internal storage capability.

They can move the cursor in all directions to add, delete and change keyed characters. Smart terminals can store and consolidate input data prior to sending them to the processor. But they cannot normally be programmed by users.

Intelligent Terminal

In combines VDT hardware with built-in microprocessor that can be programmed by the user. They can process small jobs without the need to interact with a large computer. The intelligent Video Display Terminal is designed with circuits that permit it to communicate with other terminals and large processor.

Visual Display Unit (Monitor)

A Monitor is a television like device used to display input data or information, allowing

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users to view the results of processing. Quality of the monitor if often judged in terms of resolution, which is a measure of the number of picture elements, or pixels, a screen contains. A Pixel is the smallest element of a display screen that can be controlled individually. The higher the number of pixels, the clearer and sharper is the image.

Secondary Storage device:

Secondary storage device is the non-volatile memory that is stored externally to the computer. A secondary medium is usually used for the storage of large amounts of data for permanent or long-term storage of data or programs. While the secondary media can hold much more data than primary storage, access to the data is slower. Secondary storage media is a one-half or one-fourth inch ribbon of mylar (a plastic like material) coated with a thin layer of iron-oxide material. It has been used for years as an input /storage medium for batch processing and it remains a choice today for high speed, large volume applications. It is also a medium that is often selected to store large files that are sequentially accessed and processed. It's data density (the number of characters that can be stored in a given physical space) is high and its transfer rate (the speed with which data can be copied into processor storage) is fast.

Magnetic Disk:

A magnetic disk is a mylar or metallic platter (a disk or plate) on which electronic data are stored. Unlike magnetic tapes, data on magnetic disks can also be read randomly. The data are recorded as tiny invisible magnetic spots on its iron oxide coating. Read/ write heads are tiny electromagnets that can be read, write, or erase the polarised spots that represent data on magnetic media. These heads are fastened to an arm in a disk storage device so that they can be moved quickly and directly to any disk location to store or retrieve data.

The access time for data stored on a magnetic disk is determined by two factors:

1. **Seek time :** The time required for positioning read / write head over the proper track.
2. **Latency time:** The time required for spinning the required data under the head.

Magnetic disk come in various size. They can be portable or permanently mounted in their storage devices, disk drives. They can be made of rigid metal (Hard Disks) or flexible plastic (Floppy Diskettes). They can be divided into two broad categories.

A. Fixed Disks / Hard Disk
B. Floppy Diskettes

Fixed Disk or Hard Disk

A fixed disk or hard disk is made from materials such as aluminium, instead of mylar. The Input / Output device used to transfer data to and from a hard disk is called a hard disk drive.

Hard disk may be permanently installed in a drive or may be in the form of a removable cartridge or disk pack that also can be removed from the drive.

They are of higher capacities than floppies.

Floppy Diskette

It is a small flexible mylar disk coated with iron-oxide on which data are stored. These disks are available in two sizes:

1. $3^{1/2}$ inch portable floppy disk with a maximum capacity of 2.88MB of storage space.
2. $5^{1/4}$ inch portable floppy disk with a maximum capacity of 1.2MB of storage space.

These two diskettes are individually packaged in protected envelopes. Till recently both the floppies were the most popular online secondary storage medium used in PC and intelligent terminal systems, but recently only $3^{1/2}$ inch are used all over the world.

1.8 Generation of Computers

In data processing terminology , we generally speak of computers in terms of generations to which a particular machine belongs.

The First Generation (1937-58)

As is evident, computers so far mentioned, belong to this generation and had the following characteristics:

(a) Physically large in size
(b) Inflexible in operations
(c) Contained Vacuum tubes
(d) Limited memory capabilities
(e) Generated more heat
(f) Speed was less (measurable in multi-seconds i.e 10^{-3}).

The Second Generation(1959-64)

This generation of computers were characterised by:

(a) Considerable reduction in physical size
(b) Increased reliability
(c) Greater speeds (in terms of micro seconds i.e 10^{-6})
(d) Large memory
(e) Usage of transistors as basic components
(f) Greater computing power
(g) Faster and better I/O peripherals

Examples of such computers are IBM-1401, 7070 etc., and are termed as batch processors.

The Third Generation (1965-71)

The introduction of IBM-360 series of computers in 1965 marked the beginning of this generations.

The transistors were replaced by solid state technology and integrated circuit. This led to the following developments:

(a) Greater miniaturisation
(b) Effective use of I/O devices
(c) Random access and mass storage devices
(d) Time sharing and multi-processing
(e) Higher level languages like COBOL/FORTRAN etc.
(f) Modular design
(g) Compatibility with other systems.
(h) Large memory

The Fourth Generation (1971 onwards)

The 1970s have marked the beginning of a new generation of computers produced by computer giants like IBM, ICL, NCR, BURROUGHS etc. brought about subtle but profound changes in data computation. Though, this generation gap is not clearly marked as were the earlier changes, these are considered more evolutionary than revolutionary.

From a design viewpoint, this new breed provides increased I/O capability, longer component life and greater system reliability. From a functional viewpoint, we now have powerful new languages to broaden the use of multiprogramming and multiprocessing and a major shift from on line, remote, interactive processing. From a

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managerial viewpoint, these systems make the manager's work easier and more efficient. The computer now does more communicating than computing and information acquistion and feedback and are more readily and efficiently available than before.

Software Generations

While the term "generations" stress developments in hardware, the software conception of "generations" suggests a different orientation. First generation computers were coded in machine language and the second generation systems marked the advent of symbolic assembly language (AUTOCODER etc.). The third and fourth generation computers emphasize the use of high –level languages such as COBOL, FORTRAN, BASIC and user friendly software packages such as dBASE, LOTUS etc.

1.9 Computer Classifications

(1) **Analog** : An analog computer is a physical system that behaves analogously to other physical systems, e.g., a slide rule which is a manual analog device with the physical quantity of length. Analog systems compute by measuring and are generally used in process measurements industries like electric power plants, chemical plants etc. This type of a computer answers the question "how much". Other examples of analog measurement devices are speedometers, measuring tapes etc.

(2) **Digital**: A digital computer performs arithmetic operations on numbers by counting. It answers the questions 'how many' and is commonly used in business/ commercial applications.

(3) **Hybrid**: The Hybrid computer is an effort to combine the best features of analog and logical computer and control capabilities of the digital computers. Among the applications are space vehicle simulations and solving differential equations for chemical reactors.

1.10 Computer Languages

Programming, as we know, is the process of converting broad system specifications into usable machine instruction that produce desired results. A programming language is a set of written symbols that instruct the computer hardware to perform specific tasks. Use of these symbols is governed by a set of rules called "syntax". Any program regardless of the language in which it is written consists of a sequence of instructions, which are carried out, in certain order. Design and implementation of a program is characterised by the imposition of a sense of orderliness, a systematic way of doing things.

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This consists of a set of guidelines, rules, concepts and practices which taken together are given the name structured programming.

The basic purpose of structured programming is to simplify the programming process for production of an easy to formulate and develop program. For devising a simple and clear way of expressing a particular processing intent, structured programming defines a number of standardised programming components called constructs.

Categories of Programming Languages:

There are at least several hundred and possibly several thousands different programming languages. Although each one of them has its own specifications, certain basic instructions are performed by all languages:

1. Arithmetic Instructions
2. Specification Instructions
3. Data movement Instructions
4. Input-Output Instructions
5. Logical Instructions
6. Control Instructions

All computer programming languages fit into four general categories, namely

1. Machine Language
2. Assembly Language
3. High-Level Language
4. Fouth-Generation Language

Machine Language

A computer's machine language consists of strings of binary numbers (i.e.0s and 1s) and is the only one the processor directly 'understands'. A machine language instruction would have at least two parts.

(i) Command or operation which tells the computer what function to perform. Every computer has an operation code, or "op code" for each of its function

(ii) Operand, which tells the computer where to find or store the data or other instructions that is to be manipulated. The number of operations in an instruction varies among computers.

Machine language programs have an advantage of very fast execution speed and efficient use of primary memory. Use of this language is very tedious, difficult and time consuming method of programming. This language is said to be a low-level language. Every detail of an operation to be performed in this language must be specified by the programmer. Thus a programmer (one who devices programs) should have detailed knowledge of how the machine works. It is easy to make an error and very difficult to debug (find out errors) the machine language program.

Assembly Language:

The next high level of programming language is assembly language. They are also classified as low-level languages because detailed knowledge of hardware specification is required. This language uses mnemonics in place of 0s and 1s to represent the operation codes. The word mnemonics refers to a memory aid. It uses symbolic addressing capabilities. This simplifies the programming process, as the programmer does not need not to know or remember the exact storage locations of instructions or data.

By using symbolic addressing, a programmer can express an address number to symbolic data items. They merely specify where they want the first location in the program to be and assembly language program takes in from there, allocating locations for instruction and data. Assembly program or assembler also enables the computers to convert the programmer's assembly language instructions into its machine code. A program of instructions written by a programmer in an assembly language is called a source program. This program is converted into machine code by an assembler. The resulting program is referred to as an object program.

High Level Languages:

These are languages whose instructions closely resemble human language and mathematical notation. Unlike assembly language, programs made in this language may be used with different makes of computers with little modifications. Other advantages of high level languages are :

1. easier to learn
2. requires less time to write
3. provides better documentation
4. easier to maintain

As a result, high level languages are used more often than machine or assembly languages. High level languages must also be translated into machine language before they can be used by a computer. One of the two different language-translator programs is used to translate high-level languages: an interpreter or a compiler.

An interpreter is a translator, which translates a program into a machine language one line at a time and executes line of the program after it is translated. The machine-readable form of program is not stored on any storage and therefore, the program must be interpreted each time before it is executed.

A compiler translates a whole program (source code) at once into machine language (object code) and then it can be immediately executed anytime thereafter. The source code remains intact and can be updated and then recompiled again into object code.

Examples of a few high-level languages used now-a-days are :

1. BASIC
2. FORTRAN
3. ALGOL
4. COBOL
5. PASCAL
6. ADA
7. C

(In class VII you have learnt about MSDOS and the most of the commands used in it.In this class you will learn certain advanced features of MSDOS)

1.11 MS-DOS Operating system

You will remember that MSDOS operating system consists of three files that make up the operating system. They are:

i.COMMAND.COM
ii.IO.SYS
iii.MSDOS.SYS

After the booting procedure is completed, you will see the following on the top-left corner of your screen. "**C:\>**".

[Booting is a start-up procedure by which MS-DOS is loaded into the computer's memory]

This is called the DOS prompt or Command prompt. A prompt is the way by which the computer tells the user that it is ready to accept instructions from the user. If you boot the computer from the hard disk you get the prompt as above. In case you boot the system from a floppy drive, the prompt is **"A:\>"**.
DOS only boots either from C or A drive.

DOS commands are divided under two categories :

a) Internal commands
b) External commands

Internal commands are those commands that are present along with the operating system itself i.e. they are present in the file COMMAND.COM and available as long as the machine is on.

External commands are those commands that are not present along with the operating system but supplied as separate files by the manufacturer of the operating system. They are a special type of files called executable files.

Some of the most frequently used DOS commands and their uses can be summarised as under :

Internal commands :

PATH: DOS has a mechanism called the PATH variable that provides a shortcut to locate your program. The path specifies a subdirectory path that DOS will search when it is looking for a .COM, .EXE or .BAT file that you have issued as a command.

The PATH consists of one or more drives and subdirectory paths. The PATH is called a variable because you can change its value with the DOS PATH command.
If a PATH has been specified, DOS looks first in the currently logged-on drive and subdirectory, and, if the command file is not there, DOS searches the specified path for it. If no PATH has been specified , DOS looks for the command file only in the currently logged-on drive and subdirectory.

Setting the PATH: You can specify the path to the software, say WordStar (WordStar is loaded in the directory WS.) in the DOS PATH variable, DOS will be able to find the WORDSTAR software.

To set the path of the WordStar Software we have to give the following command

```
C:\> PATH=C:\WS\WS.EYE
```

[WS.EXE is the executable file for executing the WORDSTAR software]

DIR: This command is used to display the listing of all the files and directories present under a current directory.

Syntax : **DIR [drive:][path][filename.ext] / options**

If you use the **DIR** command without any options, it shows the listing of the files and directories present under the current directory. You can use the several switches to see the output in different formats.

/P : displays the listing after pausing with a screen full of information (in each screen you can see 22 lines and the computer displays a message to 'Press any key to continue . . .' to display the listing further.)

/W : displays the output in **Wide format** i.e. it shows the names of the file or the directory , the total number of bytes occupied by the files and directories and number of bytes are free.

/B : displays bare format. It only lists the names of files or directories without any other information.

/L : displays the listing in lower case (small letters)

/S : displays files in specified directory and all subdirectories under the current directory.

/A : displays files or directories with specifies attributes.

Attributes : D = Directories **R**= Read only files **H**= Hidden files
S = System files

- : The minus sign before an attribute symbolises absence of the specific attribute e.g.

1. The command DIR/AD displays only the directories in the current directory
2. The command DIR/A-D displays only the files in the current directory.
3. The command DIR/AR displays only the read only files and directories in the current directory.
4. The command DIR/AS displays only the system files and directories in the current directory.
5. The command DIR/AH displays only the hidden files and directories in the current directory.

/O : List by files in sorted order

Sorting order :	**N** By name (alphabetic)	**S** By size (smallest first)
	E By extension (alphabetic)	**D** By date and time (earliest first)
	G group directories first	**-** prefix to reverse order

CLS: This command is used to clear the contents of the screen. After entering the command, the command prompt is positioned at the top left corner of the screen.

Syntax : **CLS**

VER: This command is used to display the current version of DOS.

Syntax : **VER**

MD or MKDIR : This command is used to create a directory.

Syntax : **MD [drive:][path] directory name**

e.g.To create a directory with a name CARNAME within a directory NAME under A or C: drive, we have to give the following command

```
MD A:\NAME\CARNAME    or   MD C:\NAME\CARNAME
```

CD or CHDIR : This command is used to navigate or move from one directory to another.

Syntax : CD [drive:][path] directory name.

e.g.

To move from root directory (A:\ or C:\) to CARNAME directory, we have to give the following command

```
CD A:\NAME\CARNAME   OR CD C:\NAME\CARNAME
```

Now your current directory is CARNAME.

CD.. : This command is used to go to the parent directory from the current directory. To return to the NAME directory we have to give the command CD..

Now your working directory is NAME.

CD\ : This command is used to go to the root directory from any directory. Assume that you are in a CARNAME directory. To go to the root directory (A:\ OR C:\) directly you have to give the command CD\ (\ implies root directory)

COPY CON : This command is used to create a file.

Syntax : COPY CON [drive:][path] [filename.ext] <Enter>

e.g. To create a file under a directory CARNAME with a name maruti.txt you have to give the command COPY CON C:\NAME\CARNAME\MARUTI.TXT

To create a file you have to perform the following steps :
- Type the command **COPY CON filename** and press **<Enter>**
- Enter the lines of text
- Press **F6** or **CTRL** and **Z** simultaneously to save the file.

TYPE : This command is used to see the contents of a specific file.
Syntax :TYPE [drive:][path] filename.ext

To see the contents of the file maruti.txt we have to give the command
TYPE C:\NAME\CARNAME\MARUTI.TXT

REN : This command is used to change the name of a file without changing the contents.
Syntax :REN [drive:][path] old filename new filename

DEL or ERASE : This command is used to remove file or files.
Syntax :DEL [drive:][path] filename.ext

RD or RMDIR : This command is used to remove a directory. Before removing a directory, you must keep the following points in mind :

- You cannot delete (remove) a directory that is not empty, i.e. the directory you want to remove must not contain any other sub-directories and files under it.
- You cannot remove the current working directory.
- You cannot remove the root directory.

Syntax :RD [drive:][path] directory name

External commands:

Some of the most frequently used external commands are shown below :

TREE : This command is used to see a graphical listing of the directories and sub-directories present under a directory.

Syntax : TREE [drive:][path]
To see the tree structure of CARNAME directory we have to give the command
TREE C:\NAME\CARNAME

CHKDSK : The CHKDSK command is intended to give us a status report of

- How much space is available and how much in use
- If there is any discrepancy in the space usage.

Syntax : **CHKDSK [drive :][pathname]/options**
Two options are available with CHKDSK command.
/F = fixes the errors on the disk. If you don't specify the switch it won't correct the errors.
/V= displays the message while it is running.

DISKCOPY : The DISKCOPY command is used to make copies of diskettes.
Syntax : **DISKCOPY Drive: Drive**
To a make a copy of a diskette in drive A
C: \> **DISKCOPY A: A:**

Then follow the instructions as shown on the screen.

SORT DOS has a utility filter program called SORT.

We can use the sort command in the following ways:

- To sort the lines of text keyed in by the Keyboard (Standard Input Device) and write the sorted output to the standard output device (Monitor), we have to perform the following steps :

1. C:\> SORT and press <Enter>
2. Enter the name of students of your class.
3. Press the F6 key and then the Enter key.
   You will find that the names of the students of your class are sorted alphabetically.

- To sort the lines of a text of a file named **Listname.Txt** and write the sorted output to the standard output device (Monitor), we have to perform the following steps :
  - Create the file **Listname.txt** with the help of **COPY CON** command
  - C:\> **SORT <Listname.txt>**, will sort the lines of text and display the sorted output to the screen.

☺ To sort the lines of text in a file named **Listname.txt** and write the sorted information to a file named **Name.Srt**, we have to give the following command

☺ **SORT < Listname.txt > Name.srt**

To see the sorted text , you must use the command **TYPE Name.srt.**

Wild card Utilities : Sometimes only those file names having a particular characteristic, e.g., those beginning with a particular letter, or having a particular extension, may have to be listed. This is easily accomplished using one of these following two methods

☺ **Asterisk (*) [Replacing filename, extension or both.]**

DOS wildcards, represented by the * (asterisk) symbol; it can be used in the file name or the extension.

For e.g. The command **DIR *.COM** will list all the files having the .COM extension

The command **DIR L*** will list all the files and the directories names starting with the letter 'L'

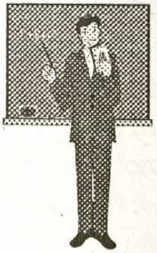
☺ **Interrogative (?) [Replacing a Single Character]**

The other DOS wildcard is represented by the **?** symbol.This replaces a single character.

For e.g. To obtain the listing of some files like FEES90, PAID90 and LOAN90 the command **DIR ????90** is used.

Chapter : 2
Algorithms and Flow Chart

We will learn about



- ☺ **Introduction**
- ☺ **Various types of symbols used in Flowchart**
- ☺ **Examples of algorithm and flowchart of various types of problems**

2.1 Introduction

Whenever you learn any language, be it English or Hindi you must start with the alphabet of the language. Each of the characters of the alphabet when combined together in various ways, produce different words with different meanings. An entire language is developed through the combination of words which help us to communicate with each other. Every language has its own special set of alphabet which has to be learnt before you can communicate in that language.

Similarly, in order to communicate with the computer you must know the language which the computer follows.

The computer only understands specific instructions in specific languages. In order to make the computer function properly you must therefore know how to write instructions or programs in the language the computer understands. This calls for the need to learn programming. A computer is useless without a program.

The computer will faithfully carry out your program, instruction by instruction. The computer has no common sense so it is up to the user writing the program to make sure that he or she has written down exactly what is expected out of the program. The first stage in writing a program is to make sure that you understand exactly what you want the computer to do. This will involve writing down a detailed description in English.

The next stage is to break up the task, that the computer is to carry out,into small steps. These steps are shown in flow chart.

Now, what is a **PROGRAM**?

A program is the sequence of step by step instruction given to the computer, to perform a desired work.
For example,

To get a glass of water, the steps will be :
#1. Get up from your seat and walk towards the table.
#2. Pick up the empty glass and move towards the water source.
#3. Fill up the glass with water.
#4. Walk back to your seat and sit down.
#5. Drink water and place the empty glass on your desktop.

For the systematic development of a solution of a problem, the method is written as a set of sequential steps. Each of these steps must be a simple sequence of actions which can be performed by using paper and pencil. Thus an algorithim may be defined as a finite and ordered sequence of sequential steps which when performed lead to solution of the problem in a definite time.

Before you think of writing programs you must know what kind of output or result you want from the computer.So write the sequence of instructions necessary to get the desired output in a step wise method. This sequence of instruction can either be written first in simple English or in a technique called FLOWCHARTING.

In very simple language you can say, a **FLOWCHART** is a pictorial step by step representation of an algorithm in a logical sequence. Flowcharts use different geometrical symbol to indicate different operations which are connected by flowlines, representing the sequence of instruction. A flowchart remains the same irrespective of the computer programming language used.

Purpose of Flowcharting :

A flowchart is essentially a picture or a diagram that helps us to define a procedure one step at a time ,and arrange it in a logical sequence .It is necessary to draw a flowchart before writing a procedure, we can easily identify the error just by looking at the flowchart .

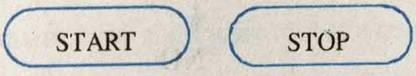
2.2 Various types of symbols used in Flowchart

In a flowchart the symbols that are used are connected by lines with arrow heads to define the direction of flow step by step.
These symbols are:

START and STOP BOX

Every flowchart should begin with a "START" symbol and end with a "STOP" symbol. The "Start" and "Stop" boxes will appear only once in each flow chart.

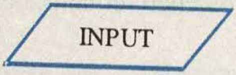
Terminator Box →

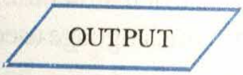


INPUT/OUTPUT BOX

The I/O symbol will appear at any point where data is to be entered or data is to be obtained from the computer .

Parallelogram →

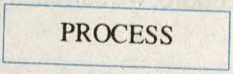




PROCESS BOX

This symbol is used to indicate the steps involved in manipulating the data in the desired result.

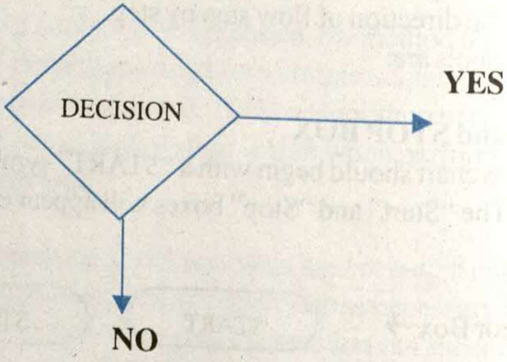
Rectangular Box →



DECISION BOX

The box is shaped like a rhombus or diamond .This box is used for testing a condition.

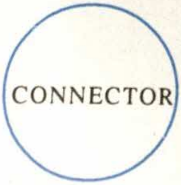
Diamond Box →



CONNECTOR

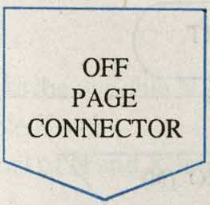
This symbol is used to indicate the transfer of flow. An arrow head leading into a connector indicates that control is to be transferred to the point at which the connector's counterpart appears. An arrow head leading from the connector indicates the point at which control is to re-enter the flowchart.

Circle →



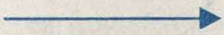
OFF PAGE CONNECTOR

An off-page connector indicates reference to another point on a different page .



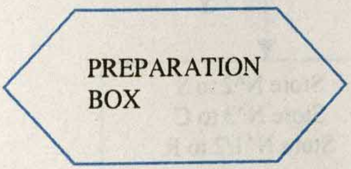
FLOW LINE

These flow lines show the direction of the flow from one step to another.



PREPARATION BOX

The shape of the box is given below .This is used for the loop "FOR-NEXT". So far as the given condition remains true ,steps will be followed using NEXT.



Examples of algorithm and flowchart of various types of problems:

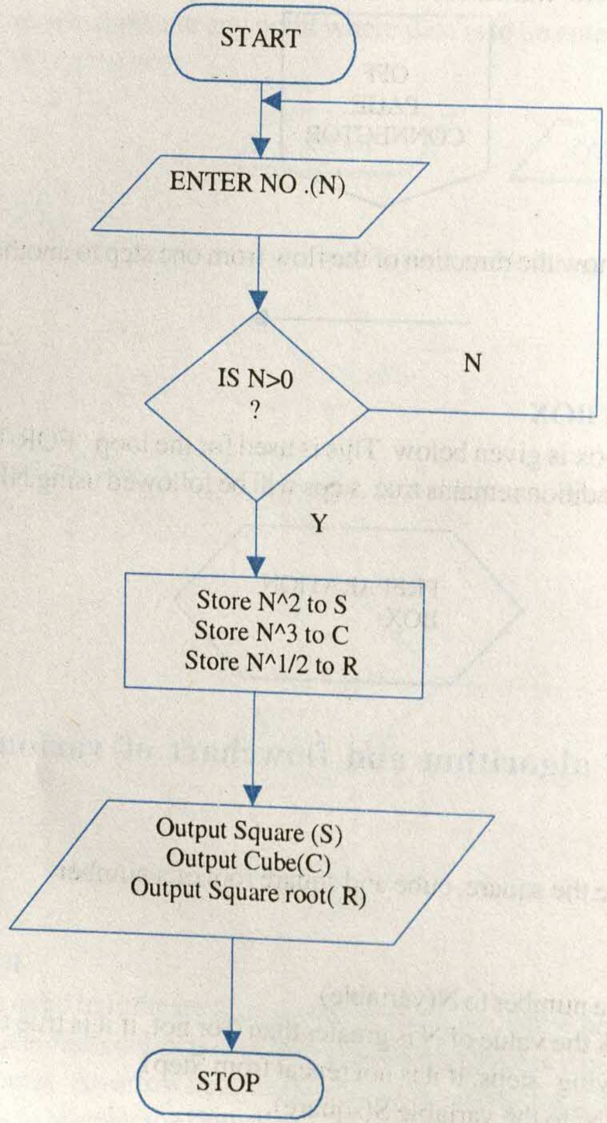
Examples

(1)To calculate the square, cube and square root of a number

Algorithm:

```
Step1 :  Read a number to N(variable)
Step2 :  Check the value of N is greater than 0 or not, if it is true then do the
         following  steps. If it is not repeat from Step1
Step3 :  Store $N^2$ to the variable S(square).
Step4 :  Store $N^3$ to the variable C(cube).
Step5 :  Store $N^{1/2}$ to the variable R(square root).
Step6 :  Print the values of S,C, R.
```

Flow Chart:

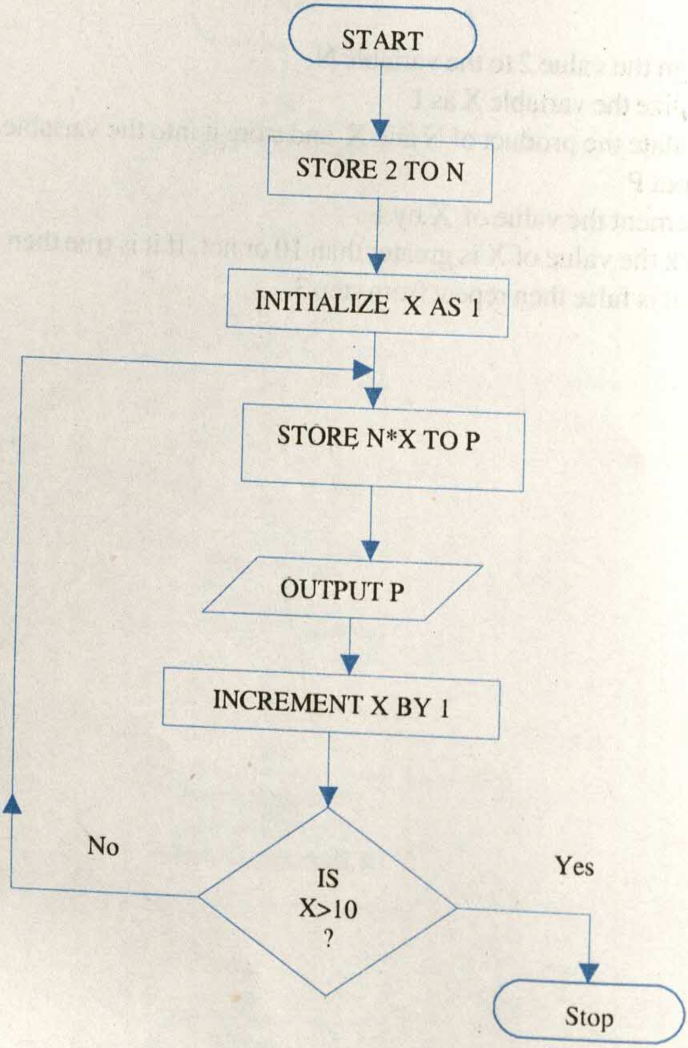

START
ENTER NO .(N)
IS N>0
?
N
Y
Store N^2 to S
Store N^3 to C
Store N^1/2 to R
Output Square (S)
Output Cube(C)
Output Square root(R)
STOP

(2) To find out the the multiplication table of 2.

Algorithm:

Step1 : Assign the value 2 to the variable N
Step2 : Initialize the variable X as 1
Step3: Calculate the product of N and X and store it into the variable P
Step4 : Output P
Step5 : Increment the value of X by 1
Step6: Check the value of X is greater than 10 or not. If it is true then stop the program, if it is false then repeat from step 3.

Flow Chart:

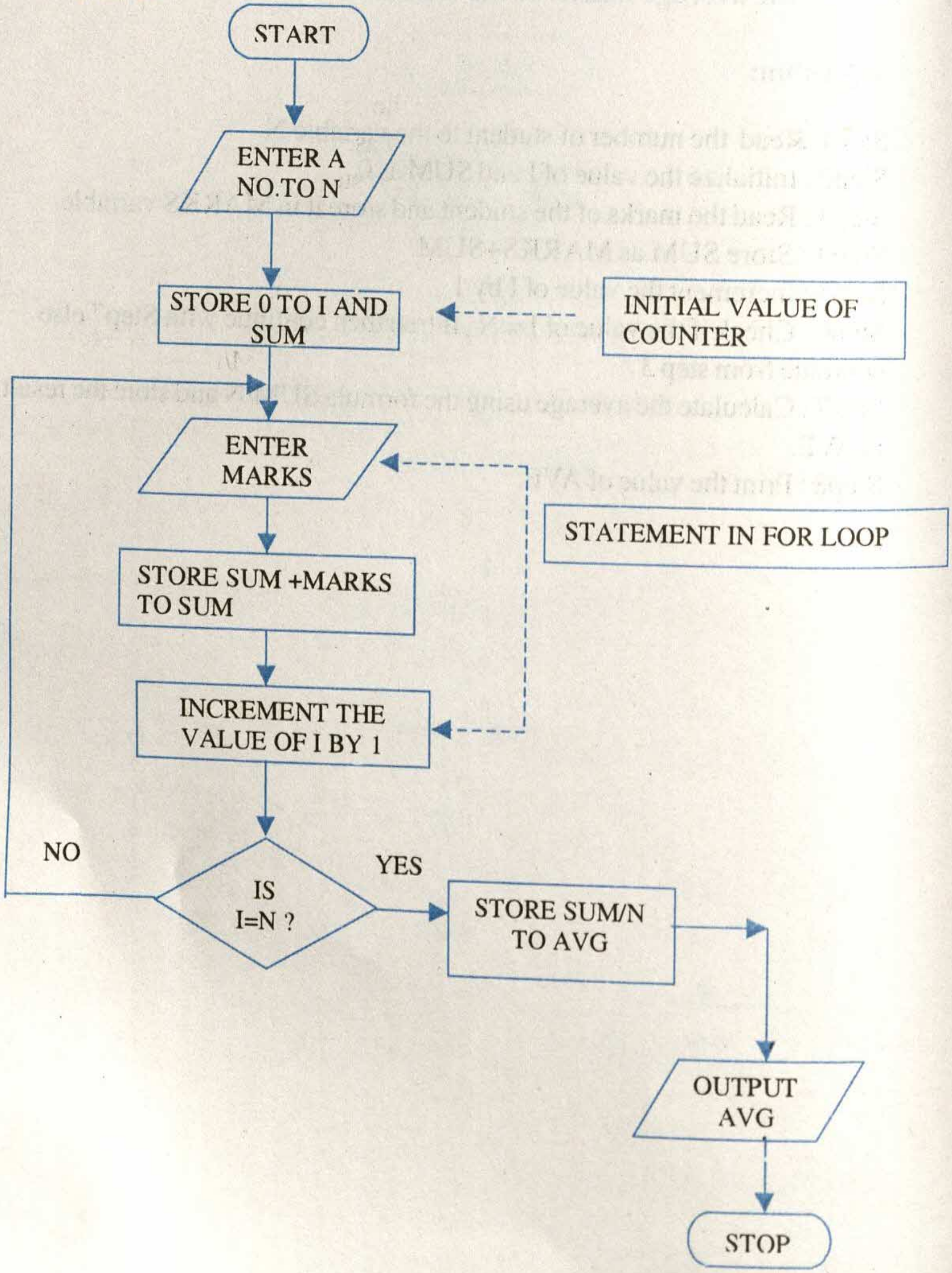

START
STORE 2 TO N
INITIALIZE X AS 1
STORE N*X TO P
OUTPUT P
INCREMENT X BY 1
IS X>10 ?
No
Yes
Stop

(3) To find the average marks of the students.

Algorithm:

```
Step1: Read  the number of student to the variable N.
Step2 : Initialize the value of I and SUM as 0.
Step3 : Read the marks of the student and store it in MARKS variable.
Step4 : Store SUM as MARKS+SUM
Step5 : Increment the value of I by 1
Step6 : Check if the value of I = N , if true then continue with Step7 else
continue from step 3
Step7 : Calculate the average using the formula SUM/N and store the result
in AVE.
Step8 : Print the value of AVE.
```

Flow Chart :

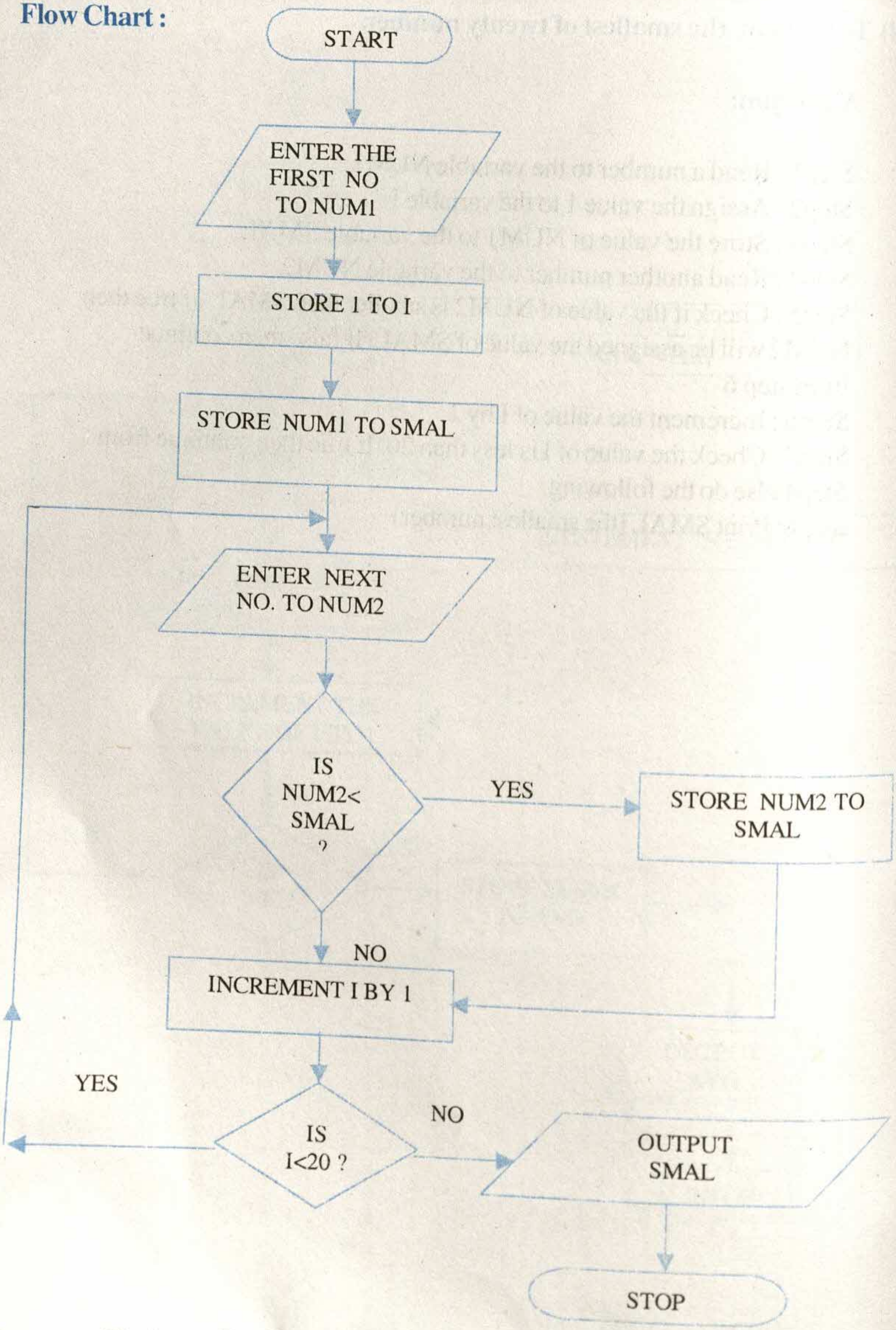

START
ENTER A NO.TO N
STORE 0 TO I AND SUM
INITIAL VALUE OF COUNTER
ENTER MARKS
STATEMENT IN FOR LOOP
STORE SUM +MARKS TO SUM
INCREMENT THE VALUE OF I BY 1
NO
YES
IS I=N ?
STORE SUM/N TO AVG
OUTPUT AVG
STOP

(4) To find out the smallest of twenty number.

Algorithm:

Step1 : Read a number to the variable NUM1
Step2 : Assign the value 1 to the variable I
Step3 : Store the value of NUM1 to the variable SMAL
Step4 : Read another number to the variable NUM2
Step5 : Check if the value of NUM2 is smaller than SMAL ,if true then NUM2 will be assigned the value of SMAL. If false then continue from step 6
Step6 : Increment the value of I by 1
Step7 : Check the value of I is less than 20. If true then continue from Step4.else do the following.
Step8: Print SMAL (the smallest number)

Flow Chart :

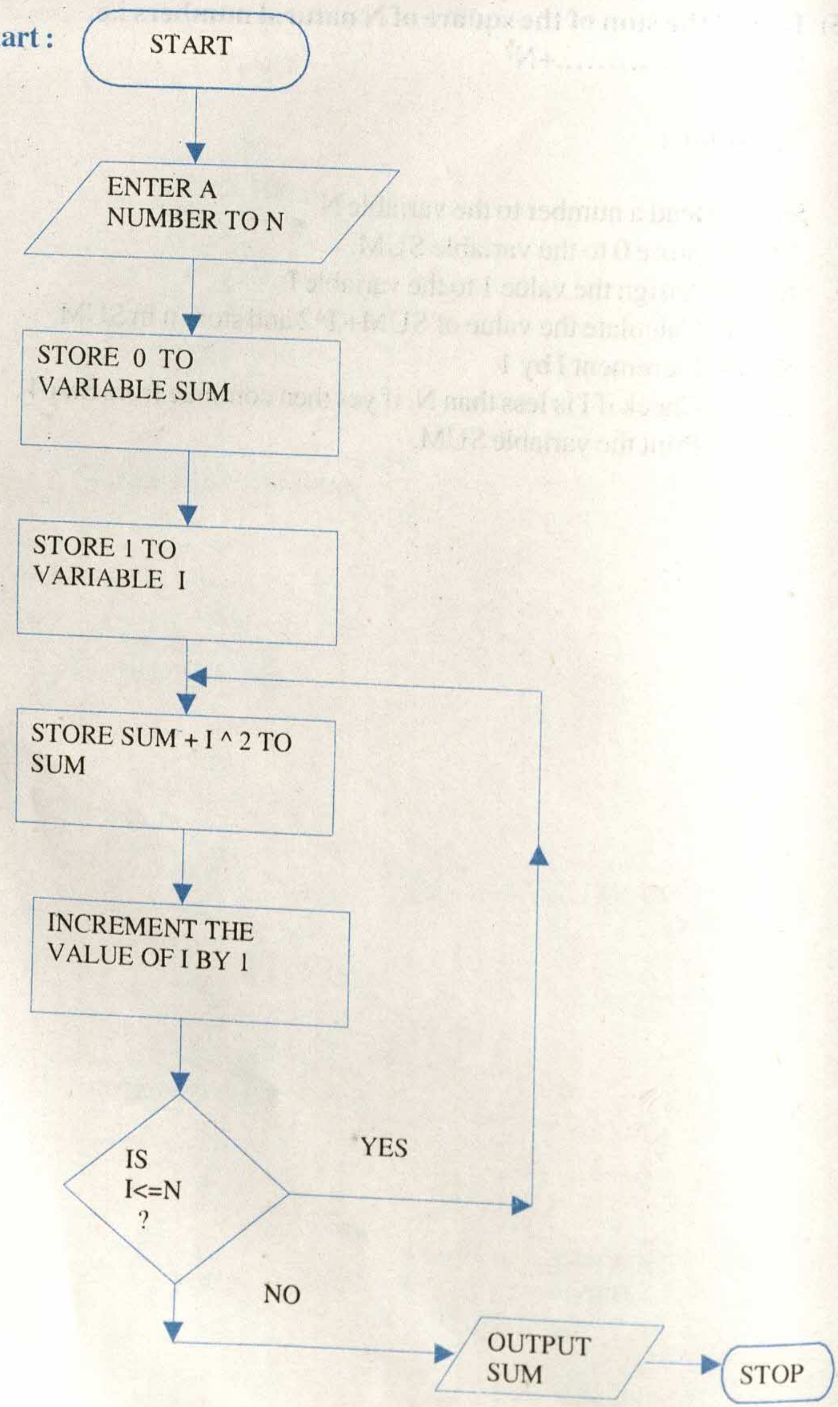

START
ENTER THE FIRST NO TO NUM1
STORE 1 TO I
STORE NUM1 TO SMAL
ENTER NEXT NO. TO NUM2
IS NUM2< SMAL ?
YES
STORE NUM2 TO SMAL
NO
INCREMENT I BY 1
YES
IS I<20 ?
NO
OUTPUT SMAL
STOP

(5) To find the sum of the square of N natural numbers i.e. $1^2+2^2+3^2$.............$+N^2$

Algotithm :

Step1 : Read a number to the variable N.
Step2 : Store 0 to the variable SUM.
Step3 : Assign the value 1 to the variable I.
Step4 : Calculate the value of SUM+ I^2 and store it in SUM.
Step5 : Increment I by 1
Step6 : Check if I is less than N, if yes then continue from Step4 .
Step7 : Print the variable SUM.

Flow Chart :


START
ENTER A NUMBER TO N
STORE 0 TO VARIABLE SUM
STORE 1 TO VARIABLE I
STORE SUM + I ^ 2 TO SUM
INCREMENT THE VALUE OF I BY 1
IS I<=N ?
YES
NO
OUTPUT SUM
STOP

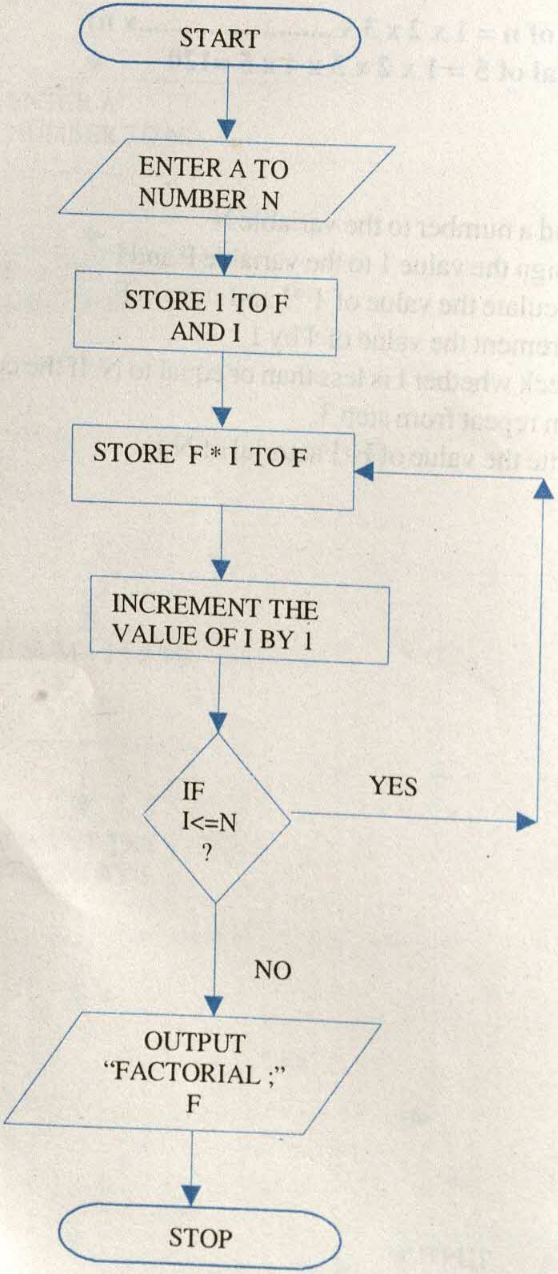
(6) To find factorial of a number.

(Factorial of n = 1 x 2 x 3 x ....x n)
e.g Factorial of 5 = 1 x 2 x 3 x 4 x 5 =120

Algorithm:

Step1 : Read a number to the variable N
Step2 : Assign the value 1 to the variable F and I
Step3 : Calculate the value of F*I and store in F
Step4 : Increment the value of I by 1
Step5 : Check whether I is less than or equal to N. If the condition is true then repeat from step 3.
Step6 : Write the value of F (Factorial of N)

Flow Chart:

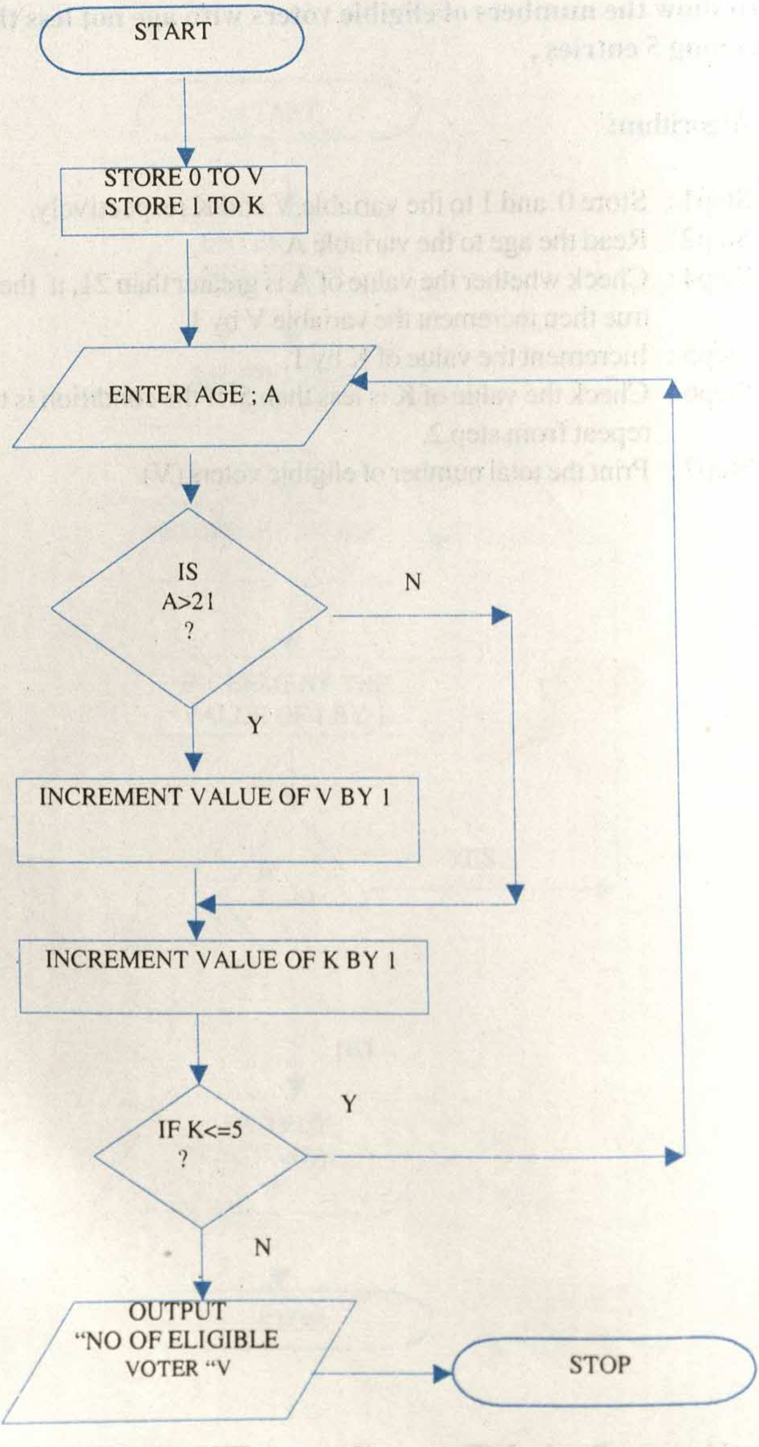

START
ENTER A TO NUMBER N
STORE 1 TO F AND I
STORE F * I TO F
INCREMENT THE VALUE OF I BY 1
IF I<=N ?
YES
NO
OUTPUT "FACTORIAL ;" F
STOP

(7) To show the numbers of eligible voters with age not less than 21 years among 5 entries .

Algorithm:

Step1 : Store 0 and 1 to the variable V and K respectively.
Step2 : Read the age to the variable A
Step4 : Check whether the value of A is greater than 21, if the condition is true then increment the variable V by 1
Step5 : Increment the value of K by 1.
Step6 : Check the value of K is less than 5. If the condition is true then repeat from step 2.
Step7 : Print the total number of eligible voters (V)

Flow Chart:


START
STORE 0 TO V
STORE 1 TO K
ENTER AGE ; A
IS
A>21
?
N
Y
INCREMENT VALUE OF V BY 1
INCREMENT VALUE OF K BY 1
IF K<=5
?
Y
N
OUTPUT
"NO OF ELIGIBLE
VOTER "V
STOP

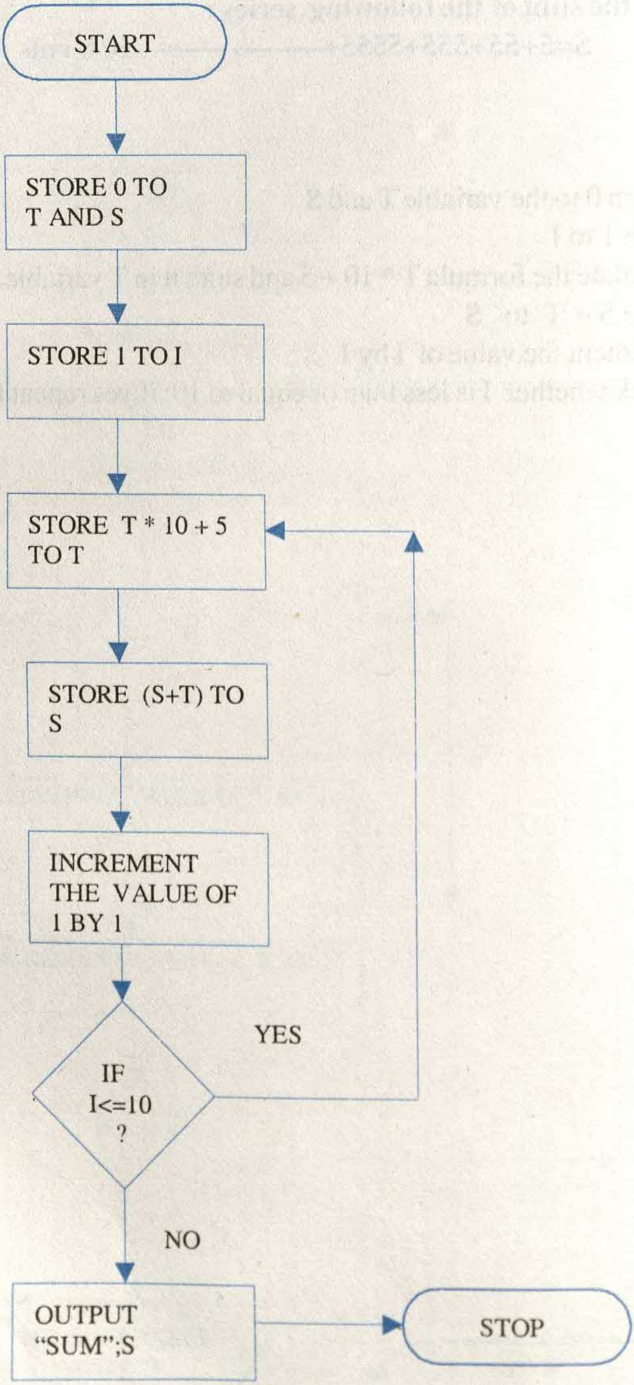
(8) To find the sum of the following series :

S=5+55+555+5555+———————10 terms

Algorithm

Step1 : Assign 0 to the variable T and S
Step 2: Store 1 to I
Step 3: Calculate the formula T * 10 + 5 and store it in T variable.
Step 4: Store S + T to S
Step 5: Increment the value of I by 1
Step 6: Check whether I is less than or equal to 10; if yes repeat from step 3.

Flow Chart:

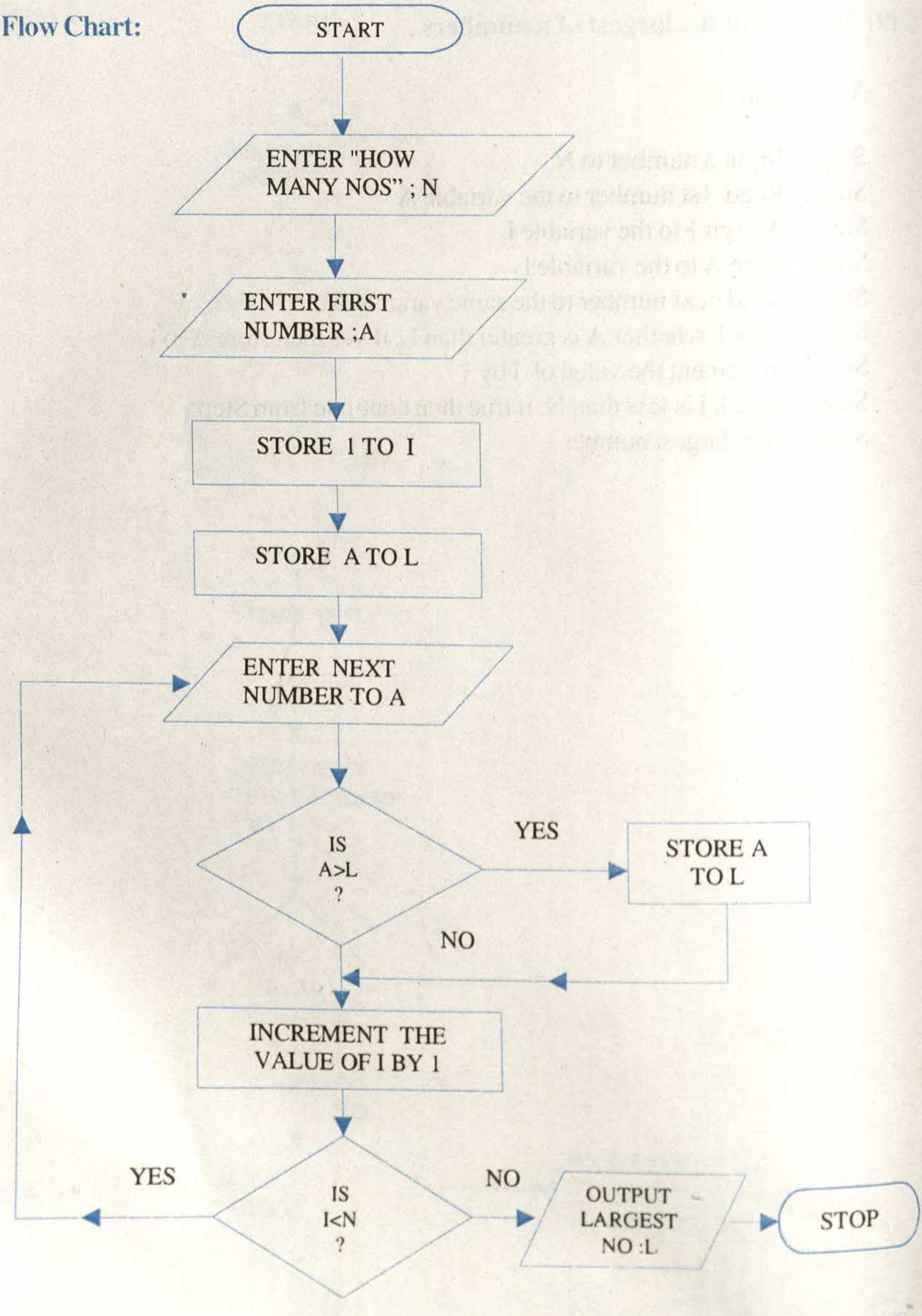

START
STORE 0 TO T AND S
STORE 1 TO I
STORE T * 10 + 5 TO T
STORE (S+T) TO S
INCREMENT THE VALUE OF 1 BY 1
IF I<=10 ?
YES
NO
OUTPUT "SUM";S
STOP

(9) To find out the largest of n numbers .

Algorithm:

```
Step1 : Input a number to N.
Step2 : Read 1st number to the variable A
Step3 : Assign 1 to the variable I
Step4: Store A to the variable L
Step5 : Read next number to the same variable A
Step6 : Check whether A is greater than L, if yes then store A to L
Step7 : Increment the value of I by 1
Step8 : Check I is less than N, if true then continue from Step5
Step9 : Print largest number
```

Flow Chart:


START
ENTER "HOW MANY NOS" ; N
ENTER FIRST NUMBER ;A
STORE 1 TO I
STORE A TO L
ENTER NEXT NUMBER TO A
IS A>L ?
YES
STORE A TO L
NO
INCREMENT THE VALUE OF I BY 1
YES
IS I<N ?
NO
OUTPUT LARGEST NO :L
STOP

Do it yourself

1. Draw a flowchart to find out the sum of digits of any number
2. Draw a flowchart to find out L.C.M and H.C.F of two numbers
3. Draw a flow chart to find out a number is even or odd.
4. Draw a flowchart to print our the prime numbers upto 100.
5. Draw a flowchart to exchange the values of two variable.

Chapter : 3

Java Programming with BlueJ

3.0 BlueJ is a free Java environment developed in Monash University, Australia. It is very popular because we can avail Java Development Kit (JDK) in window based platform. Actually we will learn to use Java programming language with an interface known as BlueJ.

The popularity of Java as a programming language can be attributed to the fact that it is hardware independent. Hardware independent implies that a java program can be run under different operating system and on different hardware environments.

Java is an Object Oriented Programming Language. In traditional programming languages, we find the linear approach of programming. Linear approach means a program which follows top down sequential structure. But it was later found that such approach was not suitable to solve complex problems. So, the concept of Object Oriented Programming was evolved.

Who developed Java and when?

In 1991, the Sun Microsystems (Broomfield, Colorado, USA) set a team led by James Gosling to develop a computer language to support consumer digital devices and web browsing. In 1992 summer, an working version **was produced with the name Oak or Java. Finally Java was marketed in 1999 with power under wrapper.**

3.1 Concepts of Class and Objects (Key to Object Oriented Programming)

Object Oriented Programming (OOP) is an approach where some units are created combining data and functions. These units are called Objects.

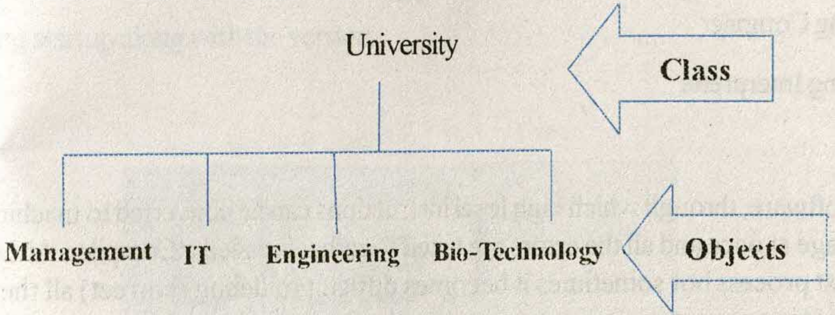
An Object contains a collection of data indicating the state of attributes and function. A "Function" is popularly known as "Method" in object oriented programming. Method implies some action that works on data.

Example : In a railway reservation system a passenger may be viewed as an object whereas the PNR number, Passenger's name, destination, distance traversed etc. are treated as attributes of the object "passenger".

Class is a concept in Object Oriented Programming, which can bundle up a group of objects with the same attributes and operation.

A class represents a set of objects that share common attributes related to the class. Class is an object maker.

Example : If a University is envisaged as a "Class" which offers different courses like Management, IT, Engineering ,Bio-Technology etc. then the different courses represent the different objects of the Class University.



3.2 Basic Features of BlueJ

i. Java is an Object Oriented Programming Language.

ii. It is a platform independent programming language.

iii. It can work on data from a local system as well as from net.

iv. Java doesn't require any preprocessor (#) directives.

v. Java programs are both compiled and interpreted.

vi. Java is case sensitive language. The upper case and lower case letters are distinguished by the language.

vii. Java programming must be written within a class. The variables and functions are declared and defined within a class.

i. Java programs can create Applets (the programs which run on Web-browsers) and Applications are general programs like any other programming language.(you will learn about Applet in higher classes)

3.3 Use of Compiler and Interpreter

It is mandatory that all high level languages need to be converted to machine code (binary code) so that the computer understands the program after taking the required inputs. Computer processes the program and then shows the results if the program is error free. Otherwise the errors needs to be corrected to execute the program successfully.

The conversion of high level language (source code) to machine level language (binary code) can be done in two possible ways

i. Using Compiler

ii. Using Interpreter

The software, through which high level instructions can be converted to machine level language at once and all the errors are listed together is called a Compiler. Although it is a fast process but sometimes it becomes difficult to debug (correct) all the errors together in a program.

The software, by which the conversion of the high level instructions is performed line by line to machine level language, is known as Interpreter. If any error is found within the program, further execution will be stopped till the error is removed. Error correction is much easier using interpreter but takes longer time to execute successfully.

3.4 Concept of Byte Code and JVM

Java is a high level programming language. Programs are written in high level language that are compiled and then converted to an intermediate language, called Byte code. This code is machine independent. This makes a Java program highly portable as the Byte Code can easily be transferred from one system to another. When this Byte Code is to be run on any other system, an interpreter is needed, known as Java Virtual Machine (JVM). It translates the byte code to machine code.

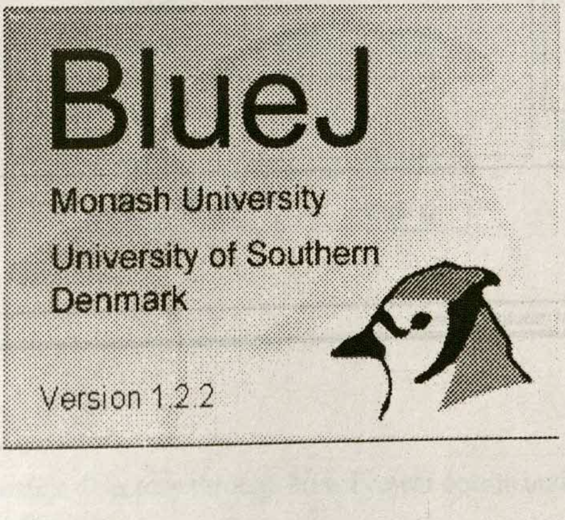
So one can say Java uses both the compiler and the interpreter.

3.5 How to install BlueJ?

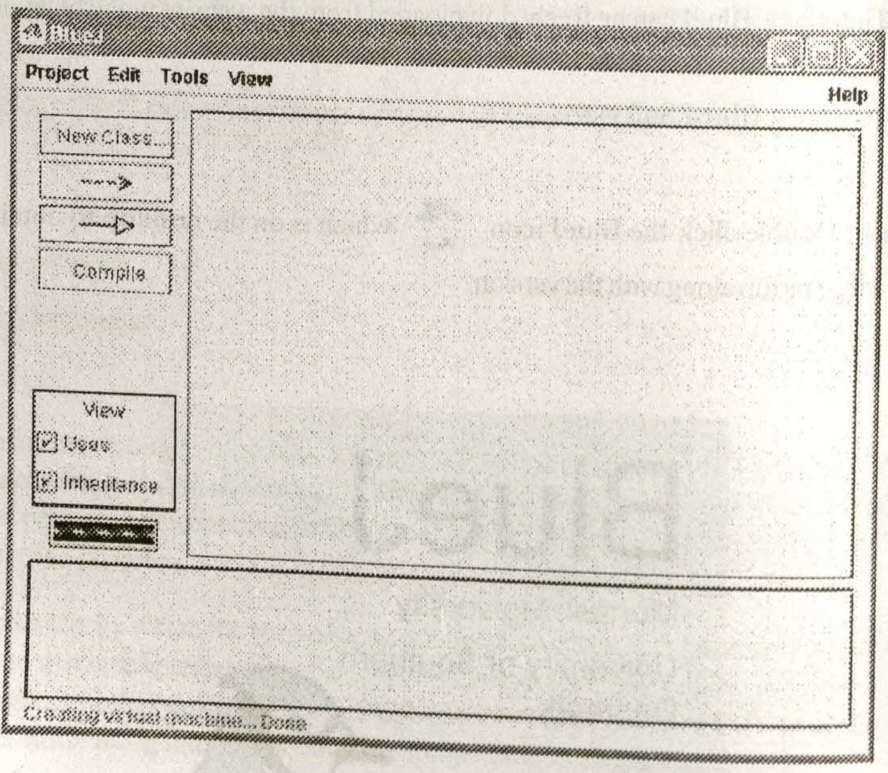
It is mandatory to install JDK1.3 or higher version first in the computer to load the BlueJ interface. BlueJ can be freely downloaded from the website www.bluej.org .

How to Open BlueJ Software

Step I : Double click the BlueJ icon which is on the desktop to obtain the following startup along with the version.

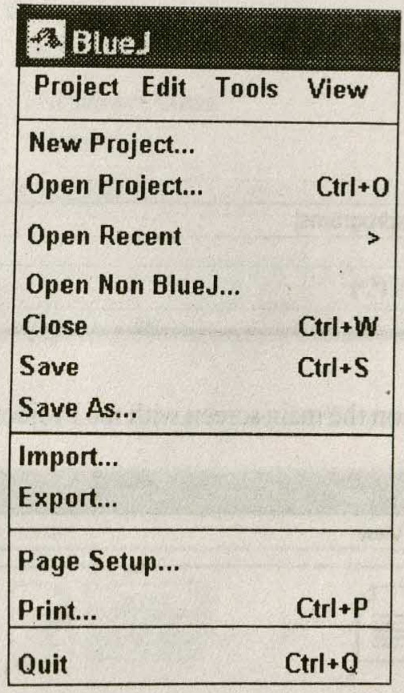


Step II : The opening software loading screen will appear and the software will be loaded within few seconds.



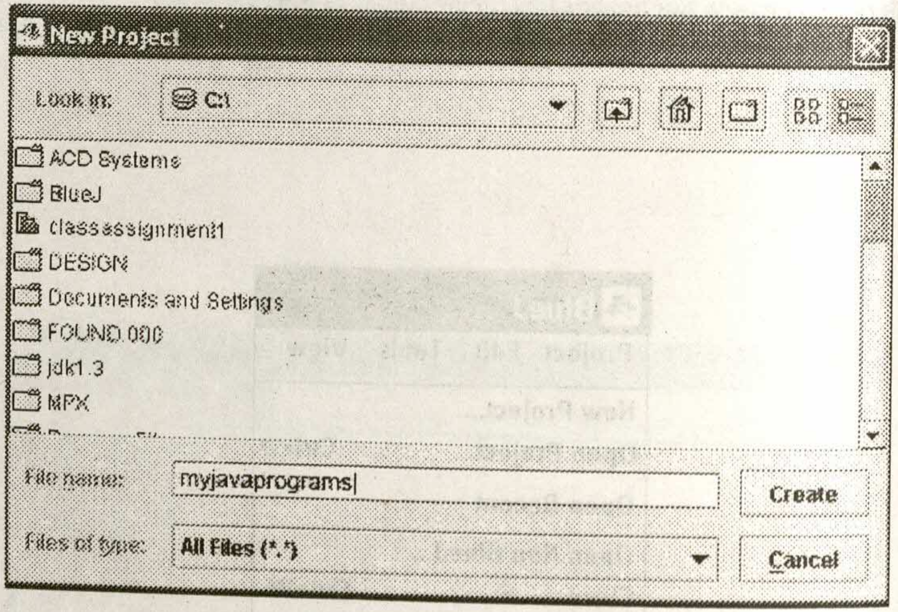
Creating virtual machine... Done

Step III : The first menu items project will appear as follows...



It is required to create a directory through New Project option under Project Menu. Now click on New Project.

Step IV : A project/directory is created after typing a suitable name in front of the space provided for Filename (say myjavaprograms) and click on Create.

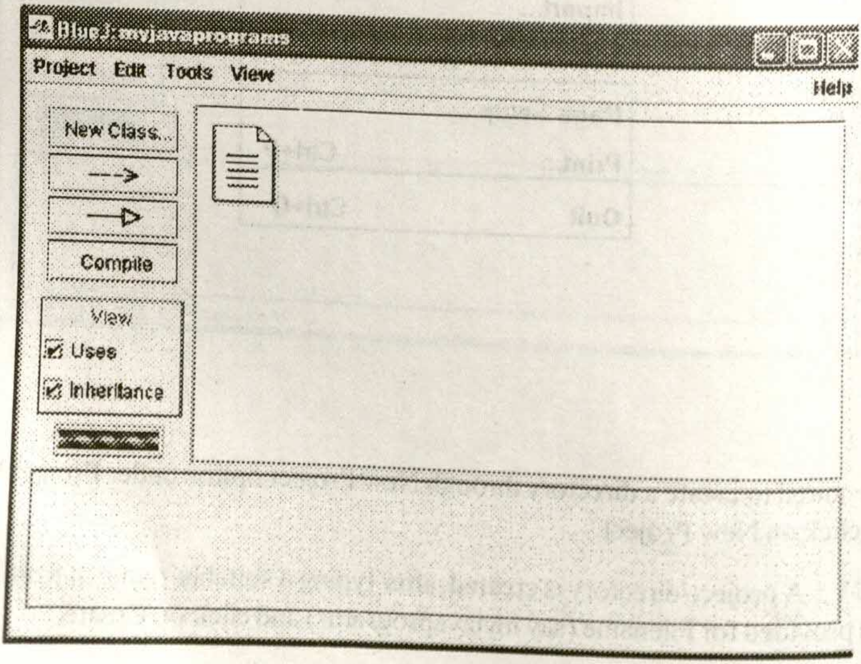


Look in: C:\

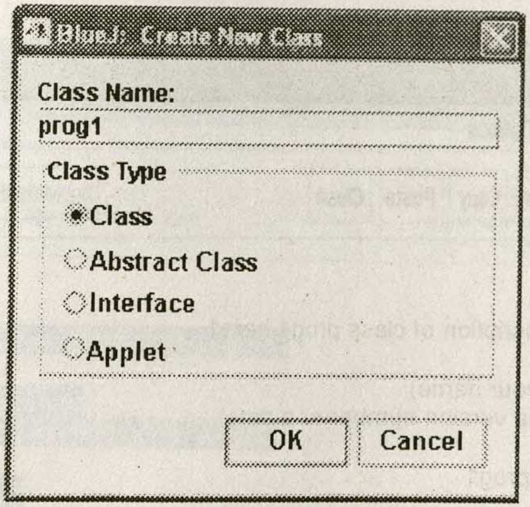
File name: myjavaprograms

Files of type: All Files (*.*)

The next screen appears on the main screen with the Project icon present on it.



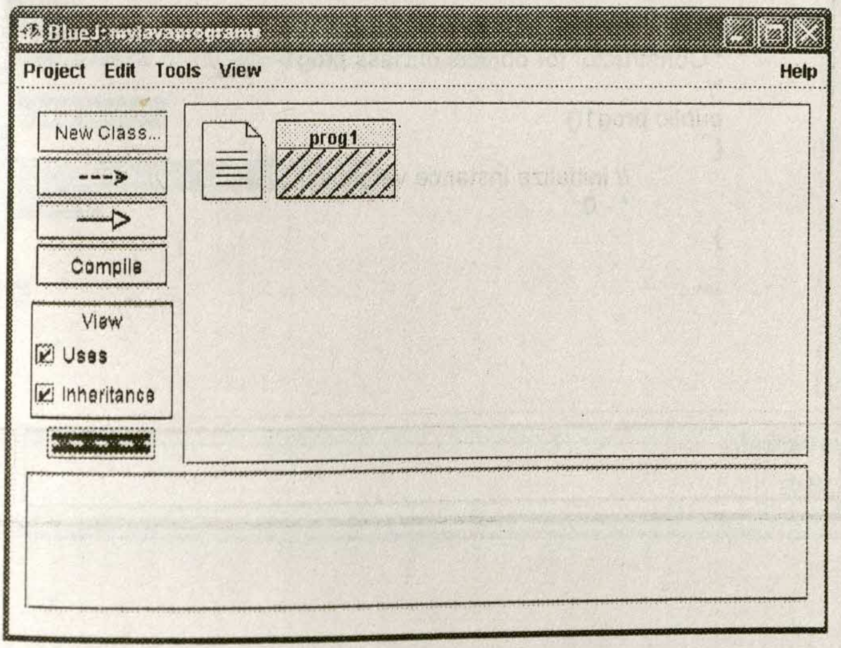
Step V : Click on New Class option. A window screen appears as follows where you type a suitable class name (say prog1) and click on Ok.



Class Name: prog1

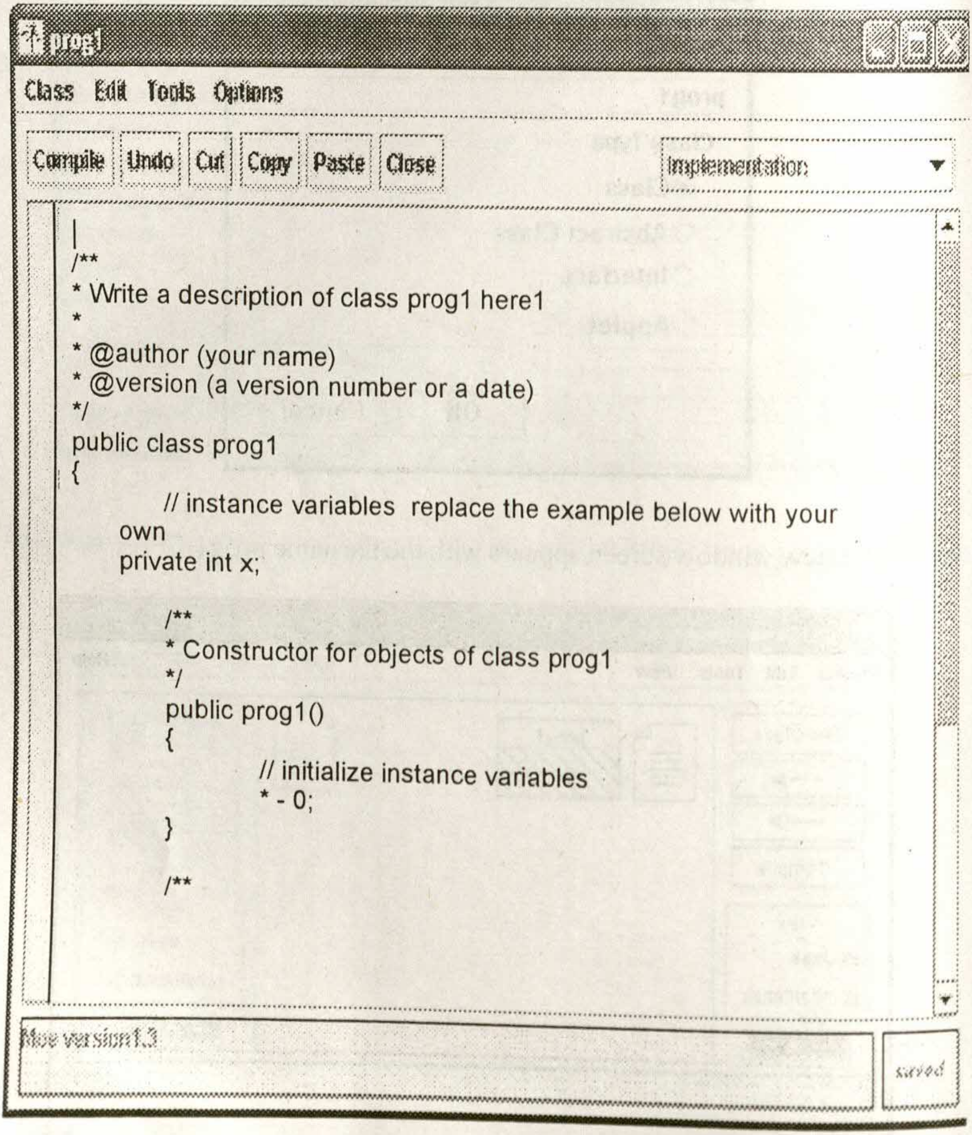
Class Type
● Class
○ Abstract Class
○ Interface
○ Applet

Step VI : A new window screen appears with the file name prog1.



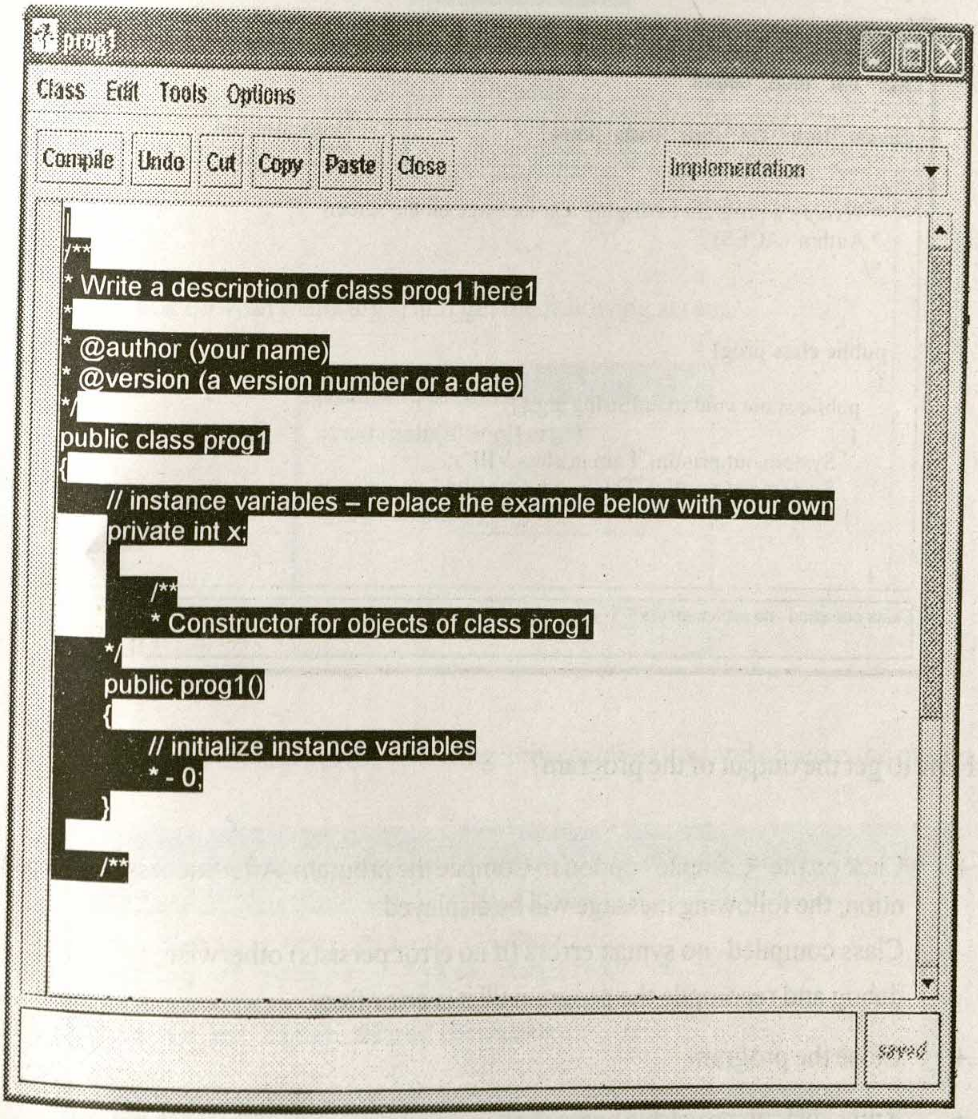
View
☑ Uses
☑ Inheritance

Step VII : Double click on the file prog1 to open the class prog1. A sample structure of the class appears on the screen.



```
|
/**
* Write a description of class prog1 here1
*
* @author (your name)
* @version (a version number or a date)
*/
public class prog1
{
        // instance variables  replace the example below with your
    own
    private int x;

        /**
        * Constructor for objects of class prog1
        */
        public prog1()
        {
                // initialize instance variables
                * - 0;
        }

        /**
```

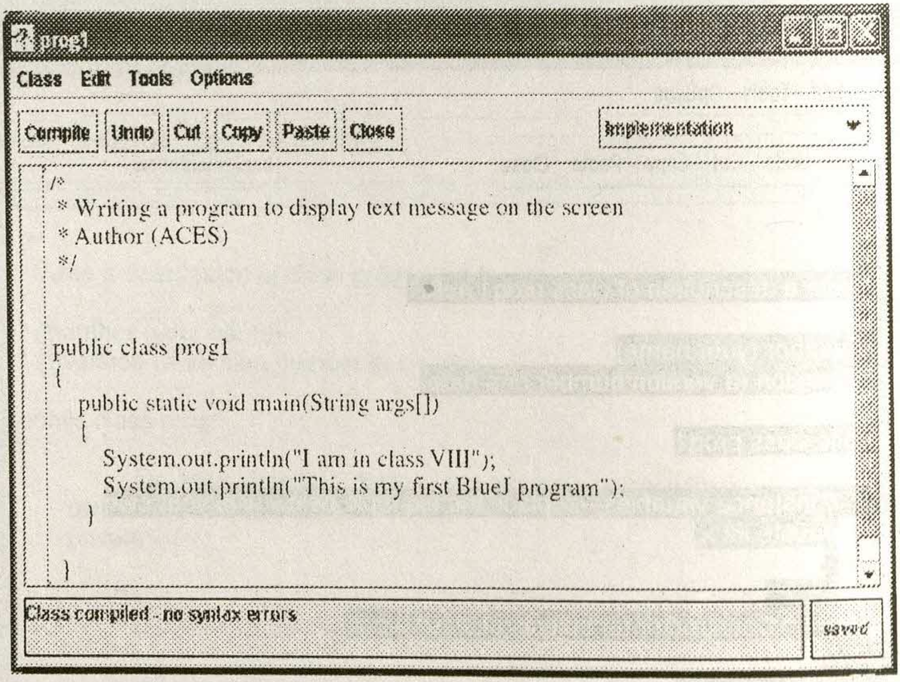
Step VIII : Select the entire sample program and delete its contents.



```
/**
* Write a description of class prog1 here1
*
* @author (your name)
* @version (a version number or a date)
*/
public class prog1
{
    // instance variables – replace the example below with your own
    private int x;

        /**
        * Constructor for objects of class prog1
    */
    public prog1()
    {
        // initialize instance variables
        * - 0;
    }

    /**
```

1.1.1 Program

Let us start typing a program as below :



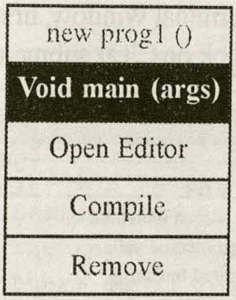
```
/*
* Writing a program to display text message on the screen
* Author (ACES)
*/


public class prog1
{
   public static void main(String args[])
   {
      System.out.println("I am in class VIII");
      System.out.println("This is my first BlueJ program");
   }

}
```

Class compiled - no syntax errors

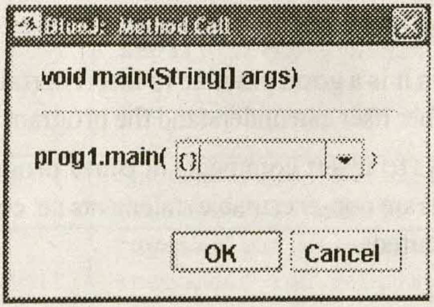
saved

How to get the output of the program?

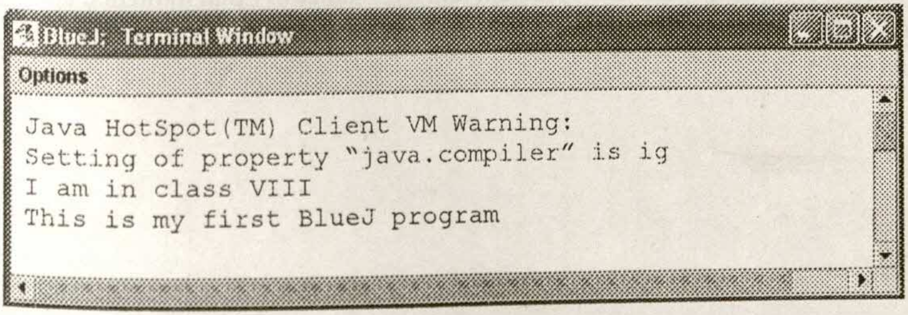
- Click on the “Compile” option to Compile the program. After successful compilantion, the following message will be displayed.
  Class compiled- no syntax errors (if no error persists) otherwise debug and recompile the program till it is error free.
- Close the program
- Right click on prog1 file name. You will find the window as given below.



- Click on void main(args) and get the following screen.

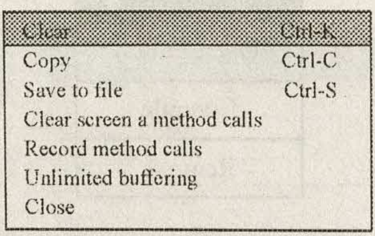


- Click on Ok and get the following Terminal Window and observe the output..



```
Java HotSpot(TM) Client VM Warning:
Setting of property "java.compiler" is ig
I am in class VIII
This is my first BlueJ program
```

- If you want to clear the Terminal Window, first click on Option menu of Terminal Window then click on Clear submenu.



Let us now try to analyse the above program line by line:

3.6 Common Comment Symbols used in BlueJ

While writing a program it is a good practice to insert certain comments wherever necessary so that any other user can understand the program better.

There are different ways to insert comments in BlueJ programming. . One has to remember that comments are non-executable statements i.e. comment lines can neither be compiled nor be executed.

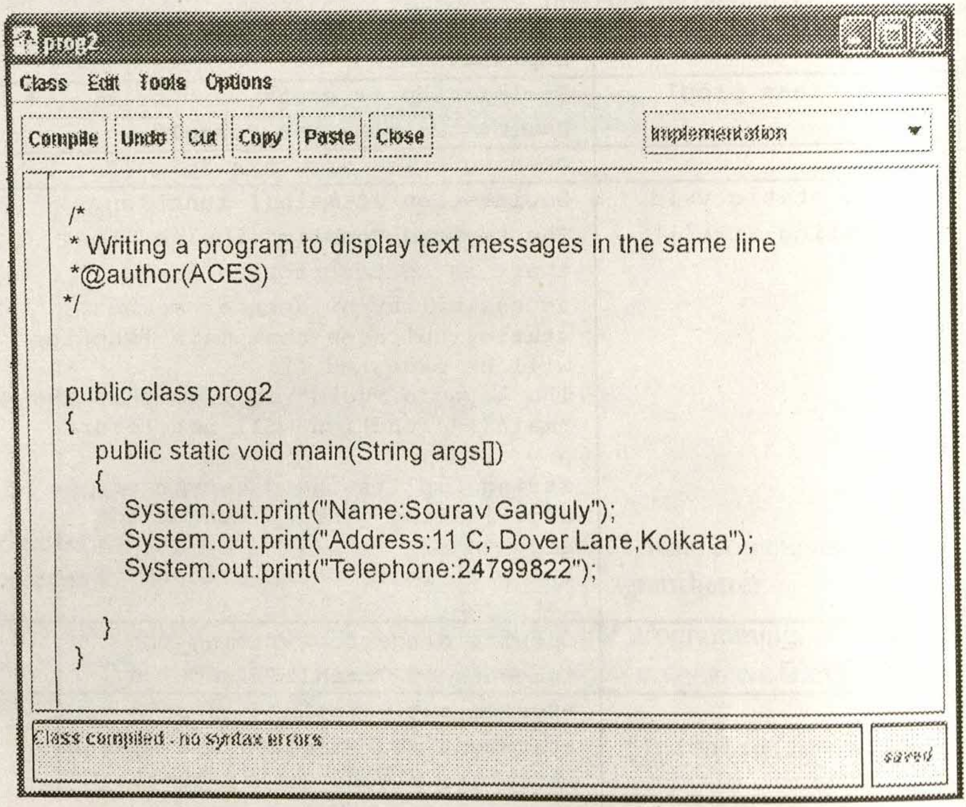
// : used for writing single line comment

/* : used for writing multi line comment and it is mandatory that multi line comments ends with */

Explanation of the program

Program	**Explanation**
public class prog1	Declaration of class as public. Naming the class as "**prog1**"
{	Opening brace of class "prog1"
public static void main(String args[])	Declaration of **main()** function. The keyword "**public**" implies that there is no restriction of accessibility by another member. **static** indicates that main function will be executed first The keyword "**void**" implies that the "**main()**" function will not return any value. **String** implies the datatype of **args[]** array ("args" stands for arguments). You will learn details about these later on.
{	Opening brace for writing the contents of "**main()**" function.
System.out.println(" TEXT1"); System.out.println(" TEXT2");	"**System.out.println**" is an output statement and displays all messages which are placed within quotes(""). The term "**println**" is used to terminate a line.
}	Closing brace of "**main()**" function.
}	Closing brace of class "**prog1**"

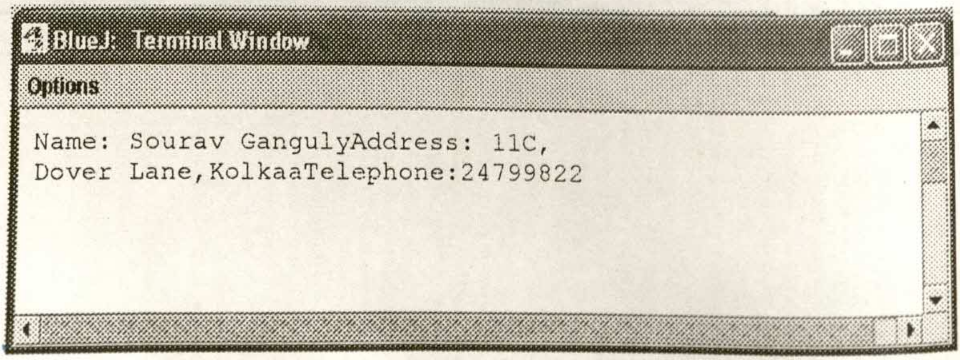
1.1.2 Writing a program to display messages in the same line.



```
/*
* Writing a program to display text messages in the same line
*@author(ACES)
*/


public class prog2
{
   public static void main(String args[])
   {
      System.out.print("Name:Sourav Ganguly");
      System.out.print("Address:11 C, Dover Lane,Kolkata");
      System.out.print("Telephone:24799822");

   }
}
```

Class compiled - no syntax errors

Output



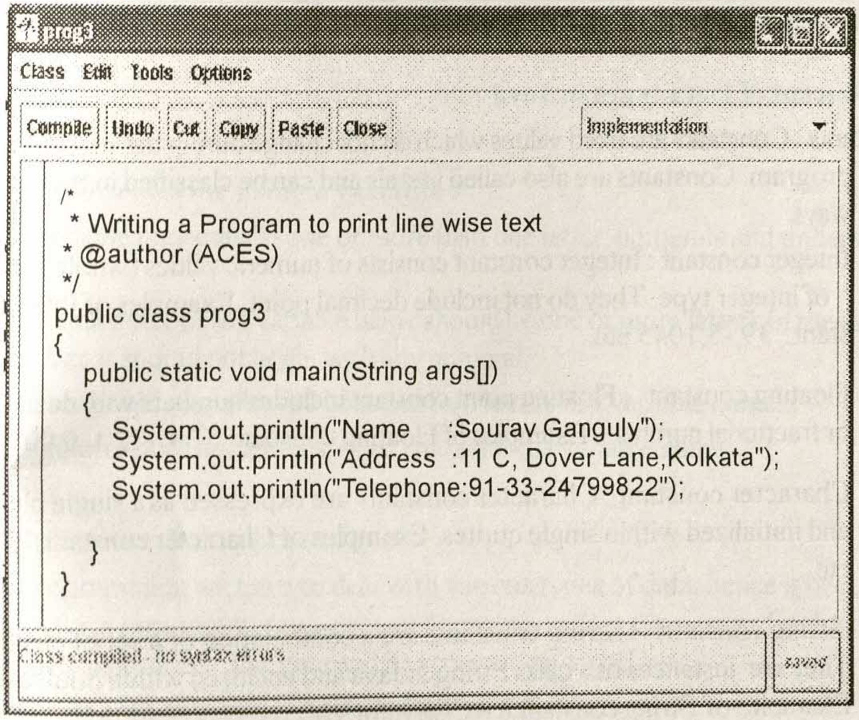
```
Name: Sourav GangulyAddress: 11C,
Dover Lane,KolkaaTelephone:24799822
```

Explanation

Program	**Explanation**

`System.out.print("Text1");`
`System.out.print("Text2");`
`System.out.print("Text3");`
	If the term **"print"** is used in place of **"println"**, the data placed within quotes are displayed side by side.

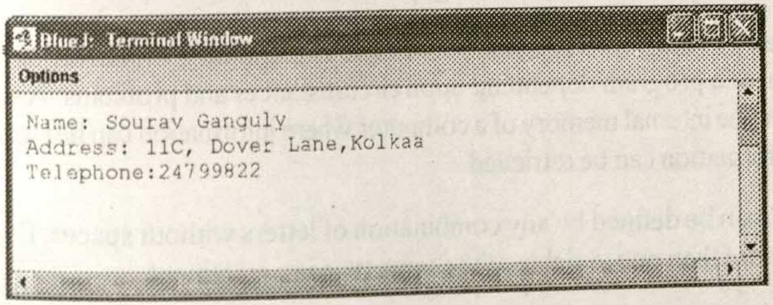
1.1.3 Program



```
/*
 * Writing a Program to print line wise text
 * @author (ACES)
 */
public class prog3
{
   public static void main(String args[])
   {
      System.out.println("Name       :Sourav Ganguly");
      System.out.println("Address   :11 C, Dover Lane,Kolkata");
      System.out.println("Telephone:91-33-24799822");

   }
}
```

Class compiled - no syntax errors

Output



```
Name: Sourav Ganguly
Address: 11C, Dover Lane,Kolkaa
Telephone:24799822
```

Explanation

Program	Explanation

`System.out.println("Text1");`
`System.out.println("Text2");`
`System.out.println("Text3");`
	If the term **"println"** is used in place of **"print"**, the data placed within quotes are displayed line by line.

3.7 Concept of Data types in Java

Constants : Constants are fixed values which do not change during the execution of the program. Constants are also called literals and can be classified in the following ways:

I. Integer constant : Integer constant consists of numeric values (whole number) of integer type. They do not include decimal point. Examples of Integer constant: 39,-5,1045 etc.

II. Floating constant : Floating point constant includes numbers with decimal part or fractional numbers. Examples of Floating constant: 5.34, -12.1, 0.00101 etc.

III. Character constant : Character constants are expressed as a single character and initialized within single quotes. Examples of Character constant: 'S', '?', 'a' etc.

IV. String constant : String constants are a combination of a set of characters. They are instances of a class String in Java and enclosed within double quotes Examples of String constant: "ACES Infotech"

"Shakti Addy", "Srijana Dasgupta" etc.

Variable : As the name suggests, a variable is a quantity which varies during the execution of a program depending upon circumstances and problems. A variable is a location in the internal memory of a computer where information can be stored or from where information can be retrieved.

Variables can be defined by any combination of letters without spaces. Even we can declare more than one variable of the same type in a statement.

Syntax : <Datatype> <Space> <variable name>

e.g., int p;(where "int" stands for integer and mentions the datatype of the variable "p"and "p" is a variable name)

float a,b,c; (where "float " stands for real or decimal number and "a","b","c" are variable names)

What are the rules for using a variable ?

1. A variable may consist one or more than one letter, numerals and underscore (_).
2. The first letter of the variable name should be one or more letters of the alphabet but it should not begin with any numeral.
3. No blank space is allowed between two letters in a variable name.
4. Computer does not allow special characters as variable name.

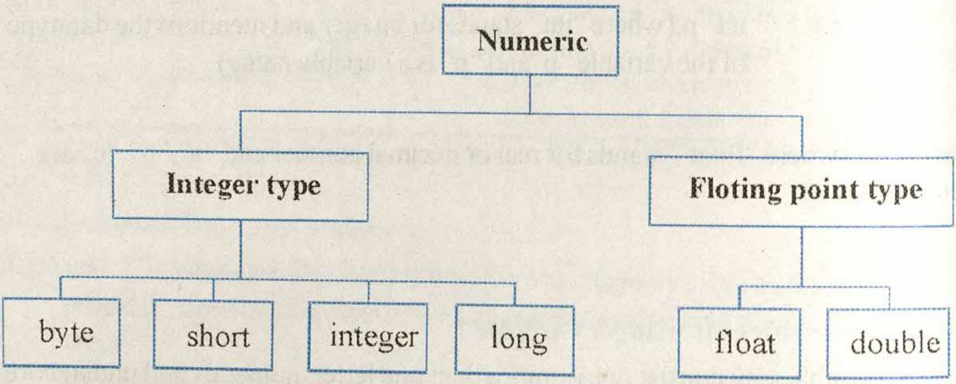
3.8 What are the data types in Java?

In Java programming we have to deal with various types of data, hence it becomes necessary for a programmer to select an appropriate data type accordingly to the data taken in a program. The data and its types are given below:

Java has eight primitive data types. These are as follows...

a) byte
b) short
c) int
d) long
e) float
f) double
g) Boolean
h) char.

The primitive data types are in built within the software. We can classify the primitive data types as follows :



Non-Primitive type : The derived data which represents a number of data values of similar or different types. e.g.: Arrays, Objects, Interface.(you will learn details about this later on)

In this class we shall discuss only two Primitive Types of Data.

Integers : Integers are whole numbers which include positive or negative numeric value having small range of values. Long integers are used for wide range of values. A programmer has to decide about selecting an appropriate data type a according to the need of a program.

Floating point constants : A fractional number which includes small positive or negative value, is a floating constant. A decimal number implies a floating number. However, a floating number also accepts an integer. Floating point types may be either float or double.

In this class we shall learn only about Integer(int) and Float(float) types of data.

Data	Data types	Byte size	Format
Integer	int	4 bytes	int a; a=15;
Decimal values	float	4 bytes	float m; m=34.45;

3.9 Operators

An operator is a symbol or a letter which helps to take an action and generate a value. An operator acts on different data items/entities called operand. Operators are classified in three different categories

1. Arithmetical
2. Relational
3. Logical

Arithmetical Operators

Arithmetical operators are used for various mathematical calculations. The result of an arithmetical operation must be a numeric value. An arithmetical expression may be a combination of variables separated by arithmetical operators.

e.g.: x+y; x+15; y*y-4*x*z; are valid arithmetical expressions.

Where x, y and z are operands and + is the operator.

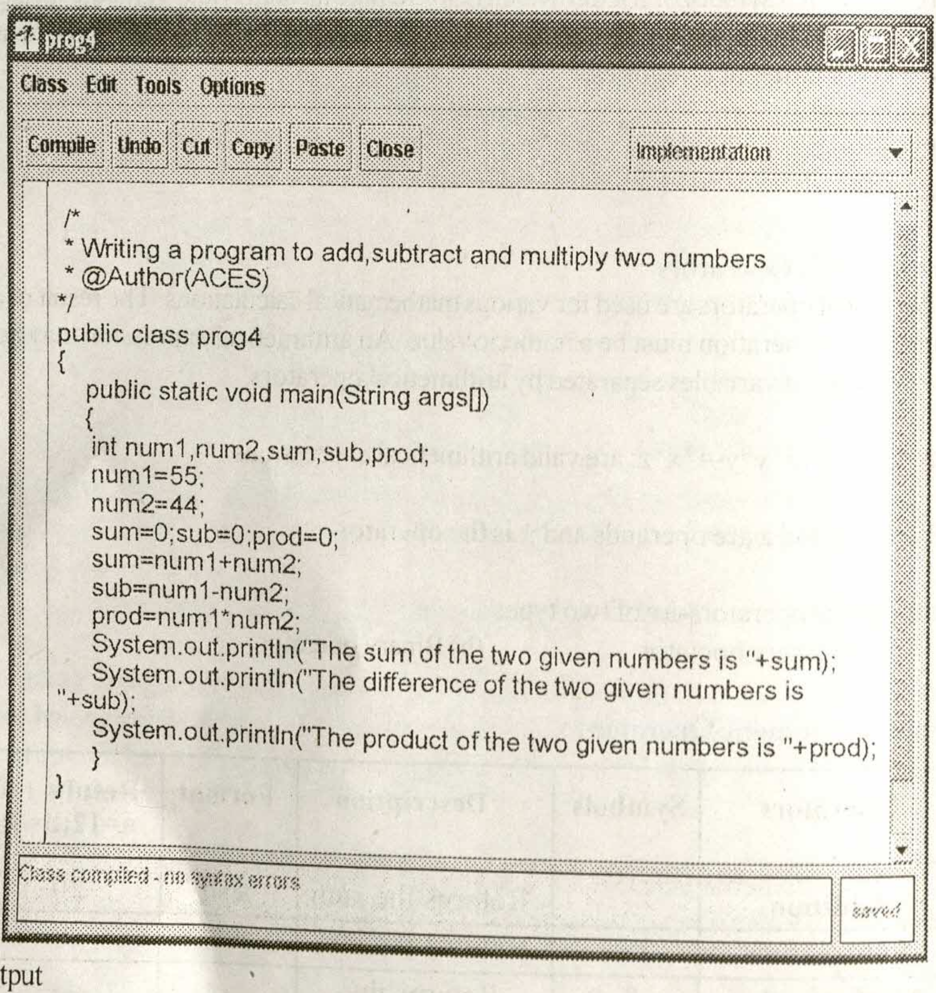
Arithmetical operators are of two types :

(a) Unary operator (b) Binary operator

Binary Arithmetic Operator :

Operators	**Symbols**	**Description**	**Format**	**Results : if a=12;b=8;**
Addition	+	Returns the sum	a+b	20
Subtraction	-	Returns the diff.	a-b	4
Multiplication	*	Returns the product	a*b	96
Division	/	Returns the quotient as integer	a/b	1
Modulus/Remainder	%	Returns the remainder	a%b	4

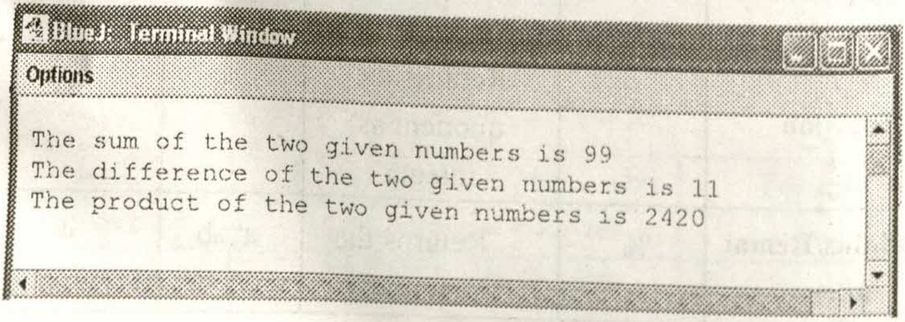
1.1.4 Writing a program to add, subtract and multiply two numbers



```
/*
 * Writing a program to add,subtract and multiply two numbers
 * @Author(ACES)
*/
public class prog4
{
    public static void main(String args[])
    {
     int num1,num2,sum,sub,prod;
     num1=55;
     num2=44;
     sum=0;sub=0;prod=0;
     sum=num1+num2;
     sub=num1-num2;
     prod=num1*num2;
     System.out.println("The sum of the two given numbers is "+sum);
     System.out.println("The difference of the two given numbers is
"+sub);
     System.out.println("The product of the two given numbers is "+prod);
     }
}
```

```
Class compiled - no syntax errors
```

Output



```
The sum of the two given numbers is 99
The difference of the two given numbers is 11
The product of the two given numbers is 2420
```

Explanation

Program	**Explanation**
`int num1, num2, sum, sub, prod`	Declaration of **variables**(*num1,num2,...*) as integer.

`num1=55`
`num2=44`
`sum=0`
`sub=0`
`prod=0`
	The value 55 and 44 are assigned to the variables ***num1*** and ***num2*** respectively using equal(=) operator.

`sum=num1+num2;`	The values assigned to the variables ***num1*** and ***num2*** respectively will be added and the result will be stored in the variable ***sum***.
`sub=num1-num2;`	The value assigned to the variable ***num2*** will be subtracted from the value of the variable ***num1*** and the result will be stored in the variable ***sub***.
`prod=num1*num2;`	The value of the variable assigned to ***num1*** will be multiplied by the value of the variable assigned to ***num2*** and the product will be stored in the variable ***prod***.
`System.out.println("The sum is "+sum);`	Displays the value of the variable ***sum*** after concatenating with the text("The sum is ").
`System.out.println("The difference is "+sub);`	**+(plus) symbol acts as concatenation operator.** Displays the value of the variable ***sub*** after concatenate with the text("The difference is ").
`System.out.println("The product is "+prod);`	Display the value of the variable ***prod*** after concatenate with the text("The product is ").

Explanation

Program	Explanation
div=num1/num2;	The value of the variable assigned to ***num1*** will be divided by the value of the variable assigned to ***num2*** and the dividend will be stored in the variable ***div***. "/" acts as division symbol.
mod=num1%num2;	The value of the variable assigned to ***num1*** will be divided by the value of the variable assigned to num2 and the modulus (remainder) will be stored in the variable ***mod***. **"%"** is the symbol for modulus operator

3.10 Type conversion

a. **Implicit type conversion:** When one type of value is assigned to another type of variable, the data type is converted automatically, if the two are compatible data type or if the variable in which value is stored of larger data type than the value to be stored.

e.g. : int a,b; long c;

c= a+b (if any one of the operand is long/float/double type, then the expression is promoted to long/float/double type respectively)

b. **Explicit/Type casting/forced type conversion:** In some cases, the required data type depends upon the user's choice and not by the system., i.e.: the user forces the system to get back into desired data type, known as Explicit type conversion.

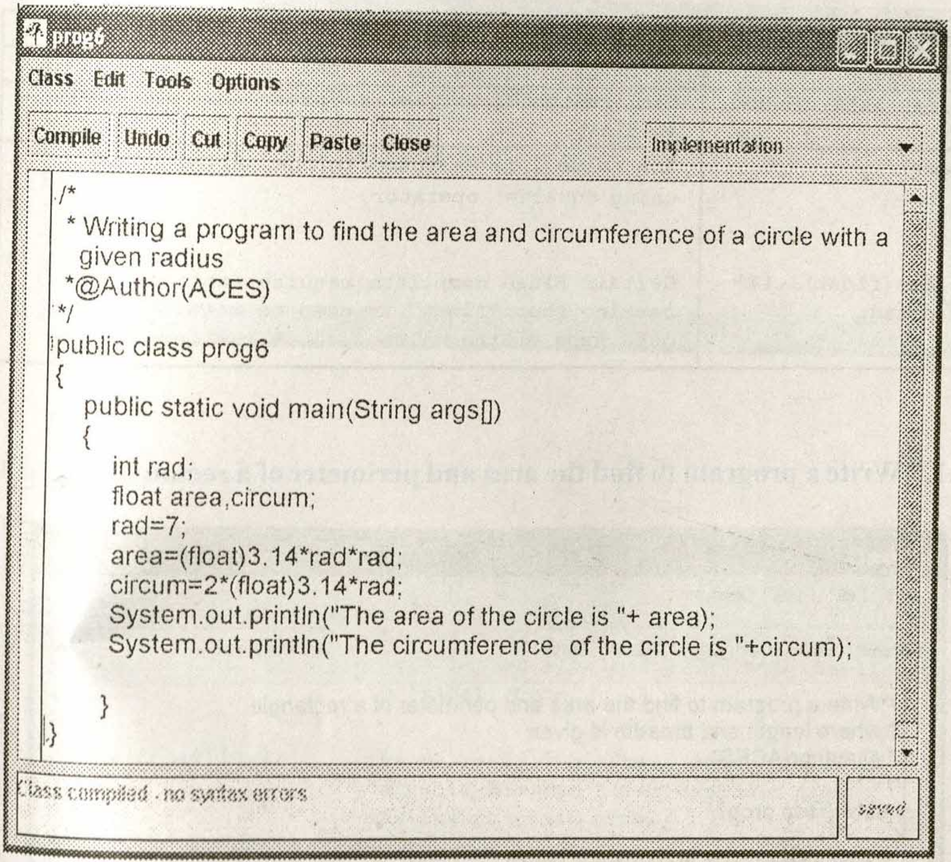
Format : (reqd. type) variable;

i. int a;float b;

a=(int)b;

b=(float)3.14;

1.1.6 Writing a program to find the area and circumference of a circle

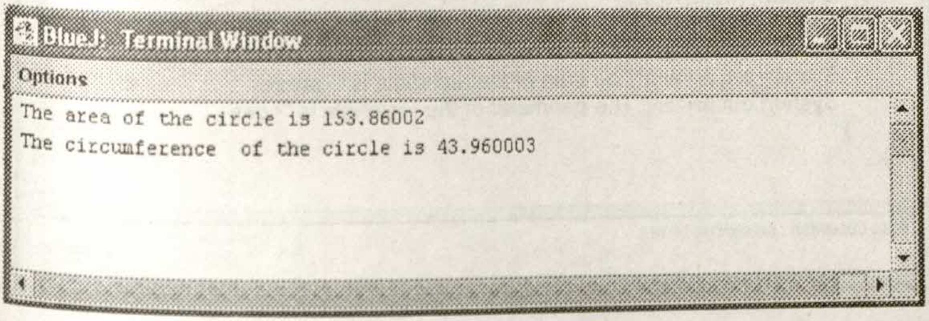


```
/*
 * Writing a program to find the area and circumference of a circle with a
   given radius
 *@Author(ACES)
 */
public class prog6
{
    public static void main(String args[])
    {
        int rad;
        float area,circum;
        rad=7;
        area=(float)3.14*rad*rad;
        circum=2*(float)3.14*rad;
        System.out.println("The area of the circle is "+ area);
        System.out.println("The circumference  of the circle is "+circum);

    }
}
```

Class compiled - no syntax errors

saved

Output

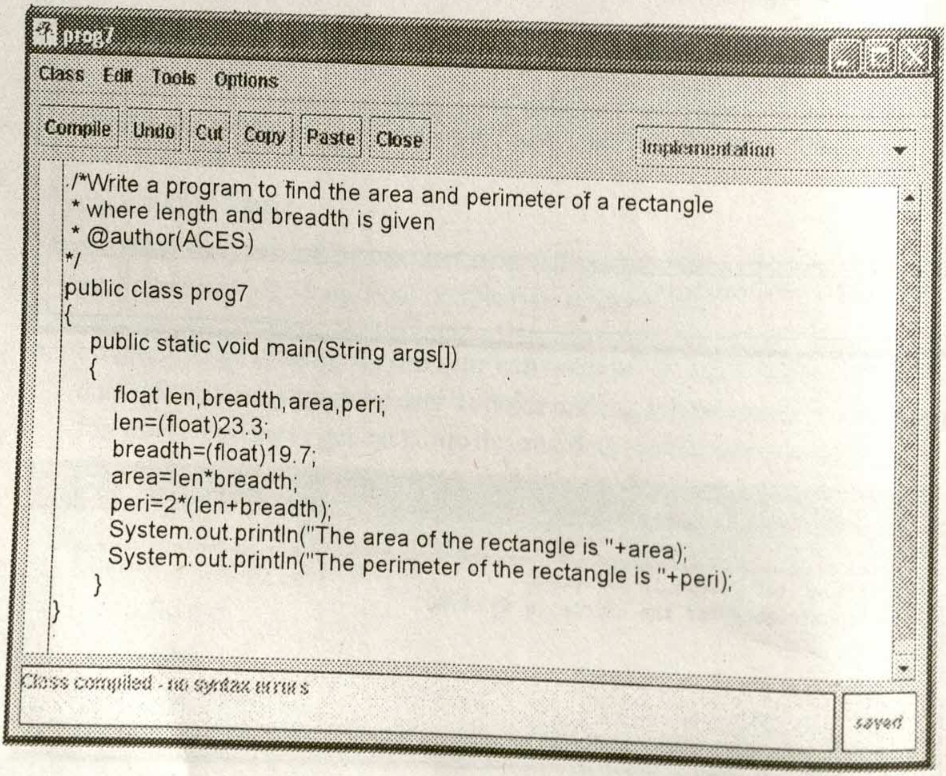


```
The area of the circle is 153.86002
The circumference  of the circle is 43.960003
```

Explanation

Program	Explanation
`int rad;`	Declaration of variable "**rad**" as integer.
`float area,circum;`	Declaration of variables "***area***" and "*circum*" as float.
`rad=7;`	The value 7 is assigned to the variable *rad* using equal(=) operator.
`area=(float)3.14* rad*rad;`	Certain BlueJ compilers require explicit type casting thus "float" is used to mention the data type of the value 3.14 in the formula

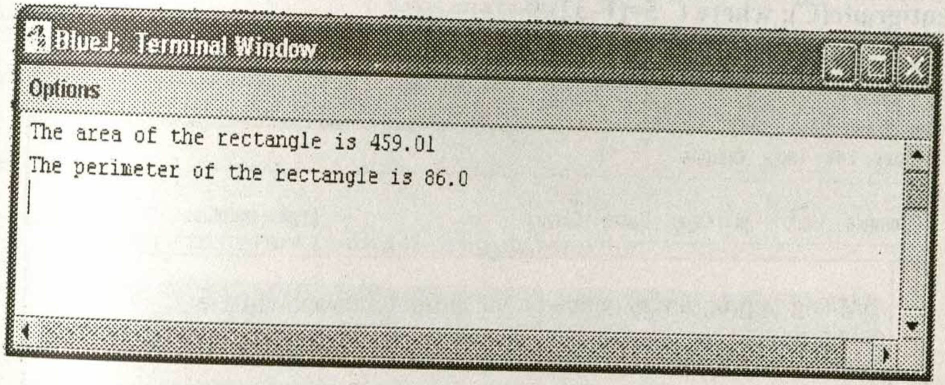
1.1.7 Write a program to find the area and perimeter of a rectangle



```
/*Write a program to find the area and perimeter of a rectangle
 * where length and breadth is given
 * @author(ACES)
*/
public class prog7
{
    public static void main(String args[])
    {
        float len,breadth,area,peri;
        len=(float)23.3;
        breadth=(float)19.7;
        area=len*breadth;
        peri=2*(len+breadth);
        System.out.println("The area of the rectangle is "+area);
        System.out.println("The perimeter of the rectangle is "+peri);
    }
}
```

Class compiled - no syntax errors

Output

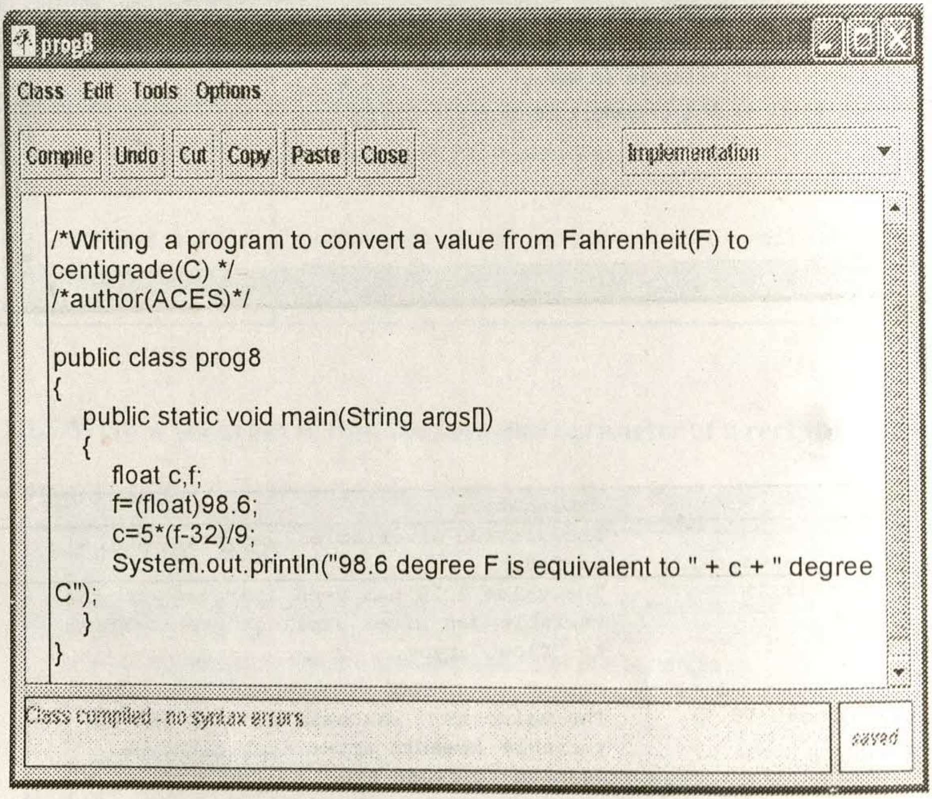


```
The area of the rectangle is 459.01
The perimeter of the rectangle is 86.0
```

Explanation

Program	Explanation
`float len,breadth,area,peri;`	Declaration ofvariables(***len,breadth***,...) as float.
`len=(float)23.3;`	The value 23.3 has been assigned to the variable ***len*** after explicit type casting to "float" type.
`breadth=(float)19.7;`	The value 19.7 has been done to the variable ***breadth*** after explicit type casting to float type.
`area=len*breadth;`	Finally the product of the variables ***len*** and ***breadth*** has been stored to the variable **area**.

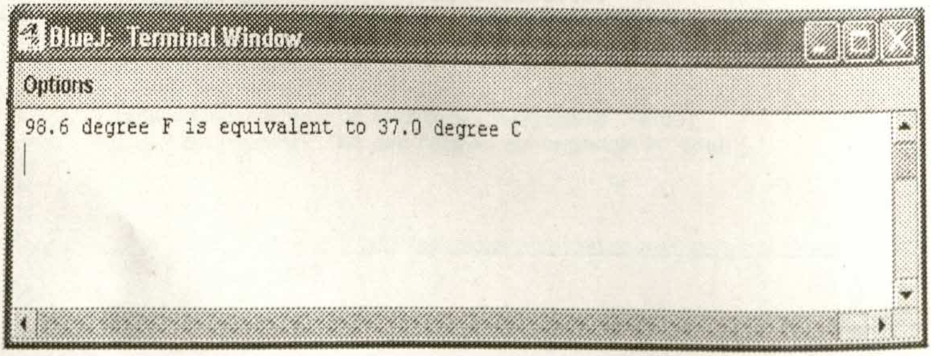
1.1.8 Writing a program to convert a value from Fahrenheit (F) to Centigrade(C); where C/5=(F-32)/9



```
/*Writing  a program to convert a value from Fahrenheit(F) to
centigrade(C) */
/*author(ACES)*/

public class prog8
{
   public static void main(String args[])
   {
      float c,f;
      f=(float)98.6;
      c=5*(f-32)/9;
      System.out.println("98.6 degree F is equivalent to " + c + " degree
C");
   }
}
```

Class compiled - no syntax errors

Output

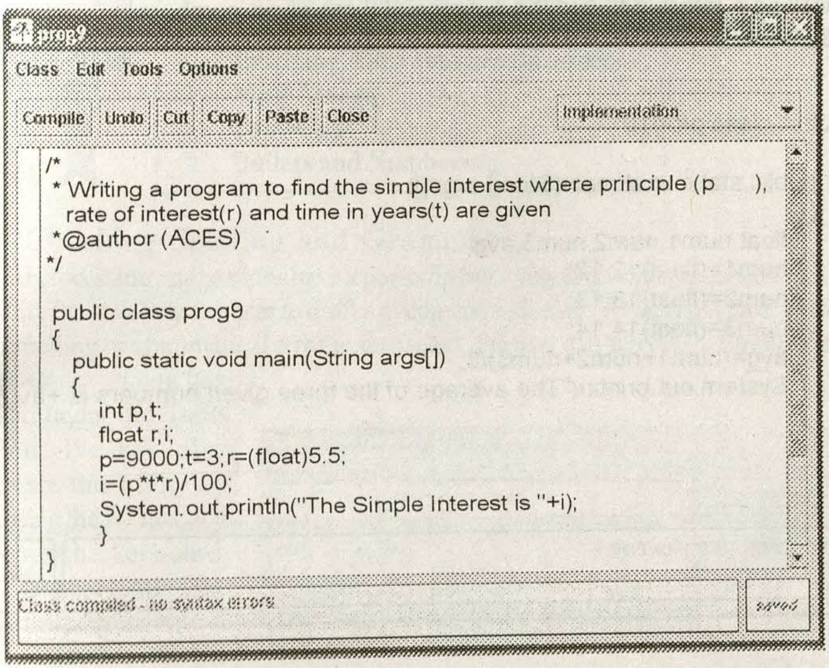


```
98.6 degree F is equivalent to 37.0 degree C
```

Explanation

Program	Explanation
`System.out.println(“Text1 “ + c + “ Text2”);`	We have displayed the value of c(variable name) after concatenating Text1 and Text2 using concatenation operator(+).

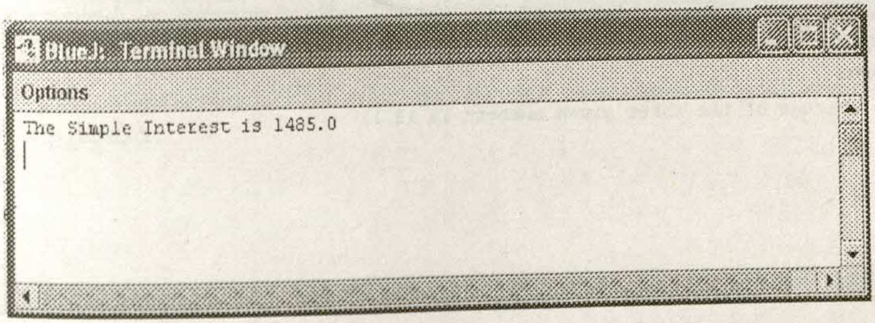
1.1.9 Writing a program to find the simple interest



```
/*
 * Writing a program to find the simple interest where principle (p    ),
   rate of interest(r) and time in years(t) are given
 *@author (ACES)
*/

public class prog9
{
   public static void main(String args[])
   {
      int p,t;
      float r,i;
      p=9000;t=3;r=(float)5.5;
      i=(p*t*r)/100;
      System.out.println("The Simple Interest is "+i);
      }
}
```

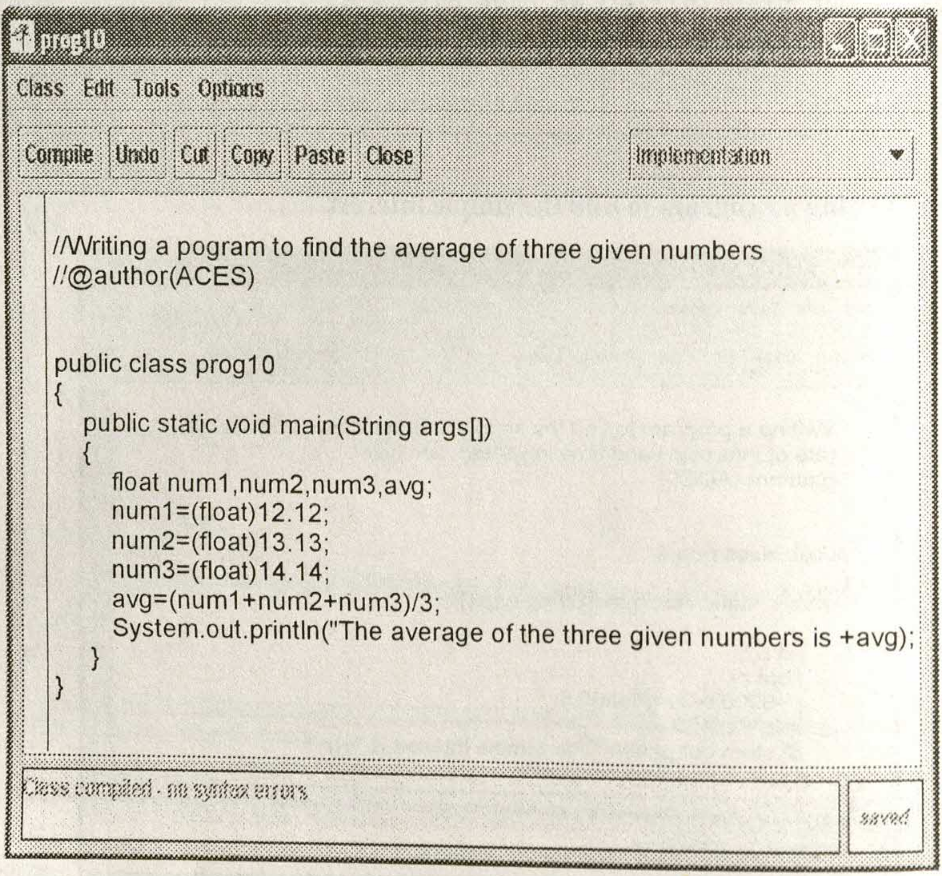
Class compiled - no syntax errors

Output



```
The Simple Interest is 1485.0
|
```

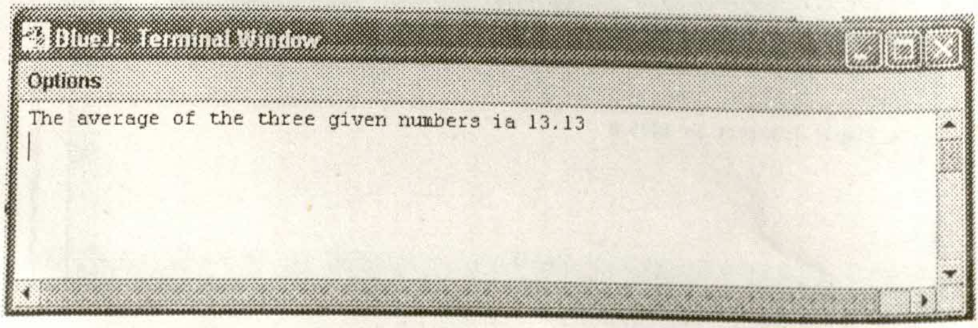
1.1.10 Writing a program to find the average of three given numbers



```
//Writing a pogram to find the average of three given numbers
//@author(ACES)


public class prog10
{
   public static void main(String args[])
   {
      float num1,num2,num3,avg;
      num1=(float)12.12;
      num2=(float)13.13;
      num3=(float)14.14;
      avg=(num1+num2+num3)/3;
      System.out.println("The average of the three given numbers is +avg);
   }
}
```

Class compiled - no syntax errors

Output



```
The average of the three given numbers is 13.13
```

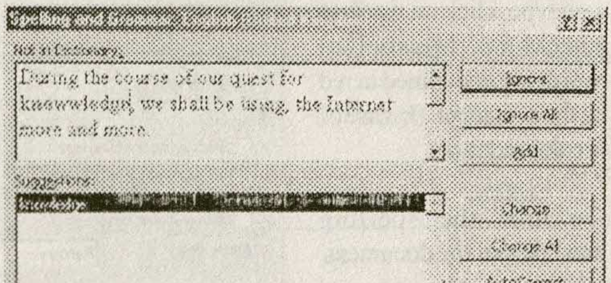
Chapter : 4
Word Processing

We will learn about

- ☺ **Spell checking and Grammar utility**
- ☺ **Creating and Formatting of Tables**
- ☺ **Inserting Auto Text in a document**
- ☺ **Mail Merge**
- ☺ **Drop Cap**
- ☺ **Bullets and Numbering**

4.1 Checking Spelling and Grammar

Word processing applications have a powerful built in spelling and grammar checking facility that can help the user to draft a document with ease. While typing a document if a spelling or grammatical error is suspected, the user can activate a **Spelling and Grammar** dialog box found under the **Tools** menu. We can also activate this utility by pressing the **F7** function key on the keyboard. The text containing the spelling or grammatical error appears on the upper part of the dialog box. In the given figure the spelling of the word knowledge is incorrectly keyed in as **knowwledge**. We find in the suggestion box the correct spelling is displayed to help the user.



During the course of our quest for knowwledge, we shall be using, the Internet more and more.

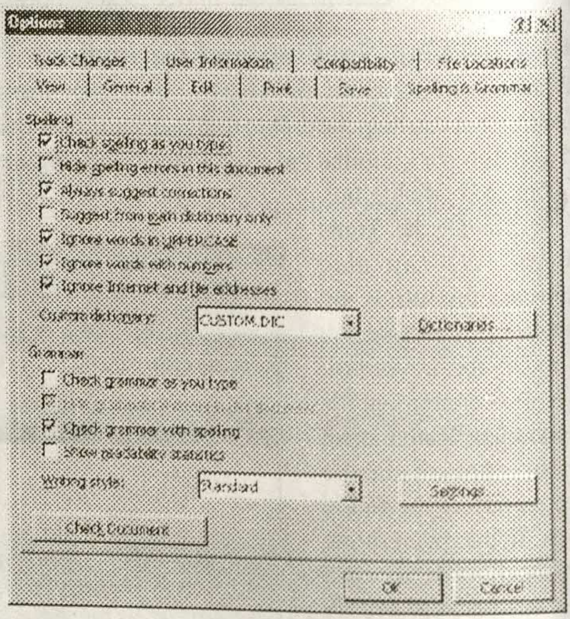
The lower part of the dialog box suggests changes to correct the error. One can ignore the error, ignore all of the same errors, go on to the next sentence, or accept the suggested change. This floating dialog remains on the screen until the spell check is complete, at which time the readability statistics dialog box appears. Unless one presses **Cancel** button, one can continue to type the document.

4.2 Setting Spelling and Grammar checking options

There are various options available with **Spelling and Grammar** Checker dialog box. One can change the default options, depending on the individual's requirement and convenience .

To change the options, first click on the **Tools | Spelling and Grammar | Options**.

The **options** dialog box will appear on the screen.



Spelling Options:

To check the spelling while you type, click on the first checkbox. Misspelled words are underlined in red in the document. (In case of a color monitor).

To hide the spelling mistakes in the document, click on the second checkbox.

To suggest spellings while typing, click on the third checkbox. To suggest a spelling from main dictionary, click on the fourth check box. This check box suggests correct spellings from the main dictionary but not from any open custom dictionaries. Clear this check box if you want Ms Word suggest correct spellings from all open custom dictionaries as well as from the main dictionary.

If we want to ignore the words in Uppercase, click on the fifth option.

To ignore words with numbers, click on the sixth option.
To ignore internet and file addresses, click on the last option.

Grammar Options

Similarly, we can select the options for the Grammar checking.

The first option allows us to check for grammatical errors while we are typing the document. Grammatical errors are indicated by green underlines in the document.(In case of a color monitor).

To hide grammatical errors while typing, we click on the second option.

To check the grammar with spelling, click on the third option.

The last option allows us to view the Readability Statistics. This shows us how readable the document is after we have completed the spelling and grammar checking.

4.3 Presentation of Text in the form of Tables

Ms-Word offers users a facility to present a text in the form of tables. It helps users to present textual and numerical data in a readable form. A table consists of rows (horizontal) and columns (vertical). When a row intersects a column, a box is created. This box is known as a **Cell**, similar to a cell in a spreadsheet.

We will discuss how to key in text in the form of a table with the help of an example. Suppose, we want to create the following table :

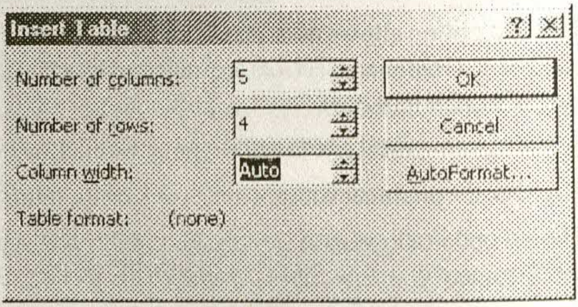
Name	Physics	Chemistry	English	Maths
Ajay	97	69	89	56
Vijay	74	87	76	75
Sourav	66	83	82	87

In order to create the table, we have to perform the following steps:

- Click on **Insert Table** command under **Table** menu.

The **Insert Table** dialog box will appear on the screen.

- Select the number of columns from **Number of columns** option with the help of Up and Down arrow keys or type in the number of column(s) in the given box as per your requirement Let us take the number of columns as 5.



Insert Table

Number of columns: 5

Number of rows: 4

Column width: Auto

Table format: (none)

- Select the number of rows from **Number of rows** option with the help of Up and Down arrow keys or type in the number of row(s) in the said box as per your requirement. Let us take the number of rows as 4.
- Click on **OK** button.
  The table is created. We have to insert the required text within the table.
- We can move from one cell to another by clicking the mouse on the desired cell or by pressing the arrow keys or pressing Tab key and then key in the text.

4.4 Inserting Rows and Columns in a Table

Let us try to insert a column between the 3rd and the 4th column and insert a row between 3rd and 4th row and enter appropriate data in the newly inserted column and row.

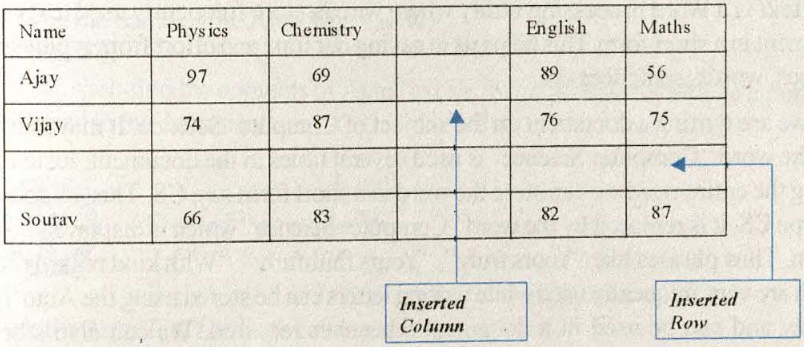
In order to do the above operation, we have to perform the following steps:

- Select the 4th column.
- Click on **Insert Columns** command under **Table** menu.

You will find a column is inserted between 3rd column and 4th column as given in the figure.

- Select the 4th row
- Click on **Insert Rows** command under **Table** menu.

You will find a row is inserted between 3rd row and 4th row as shown below.



Name	Physics	Chemistry		English	Maths
Ajay	97	69		89	56
Vijay	74	87		76	75
Sourav	66	83		82	87

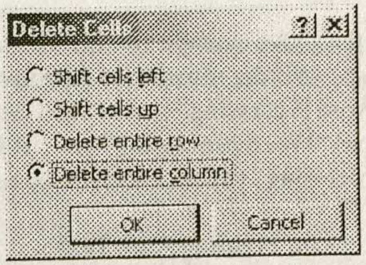
Inserted Column
Inserted Row

4.5 Deleting Rows and Columns from a Table

Just the way we have facilities in MS WORD to insert columns and rows, it also offers facilities for deleting unwanted rows and columns.

Deleting a Column

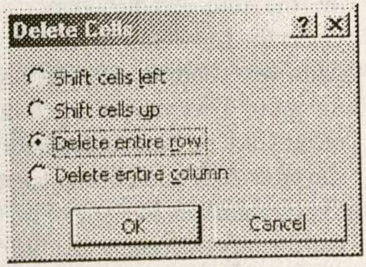
- Click inside any cell in the column that you want to delete.
- Click **Delete cells** under **Table** menu **Delete Cells** dialog box will appear on the screen
- Select **Delete entire column** option.
- Click on **OK** button.



○ Shift cells left
○ Shift cells up
○ Delete entire row
● Delete entire column

Deleting a Row

- Click inside any cell in the row that you want to delete.
- Click **Delete cells** under **Table** menu. **Delete cells** dialog box will appear on the screen.
- Select **Delete entire row** option.
- Click on **OK** button.



○ Shift cells left
○ Shift cells up
● Delete entire row
○ Delete entire column

4.6 Auto Text / Auto Correct

Auto text is a Word processing utility where we can store frequently used texts of a document in a short form. This helps us in saving our time and effort from typing long phrases, words, sentences etc.

Say, we are writing a document on the subject of Computer Science. It may happen that the word "Computer Science" is used several times in the document. Instead of typing the entire word we can store the word in a short form say, CS. Then as soon as we type CS, it is replaced by the word "Computer Science" which is displayed on the screen. Thus phrases like "Yours truly", "Yours faithfully", "With kind regards" etc. which are very frequently used while writing letters can be stored using the Auto Text facility and can be used in a document whenever required. We can also store a paragraph of text or even a word with the help of Auto Text.

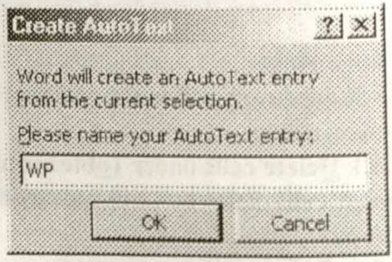
Lets us see the document below:

Word processing helps us to store our document
Word processing helps us in formatting our documents in various styles.
Word processing helps us to check the Spelling and Grammar of a document.

In the above example, we find the word "Word processing" has been used several times. In order to avoid the repetitive typing of the same text, in this case the word "Word Processing" we can avail the Auto Text facility for using short form for the word "**Word processing"** say "**WP"**. The moment we type WP the word "**Word processing**" will appear on the screen.

Steps for creating Auto Text:

- Select the text (In this use, 'Word Processing') that you want to store into the Auto Text dictionary.
- Under the **Insert** menu, you will find **Auto Text** submenu. Highlighting on the **Auto Text** we get a pull down menu. Click on **New** command or you can press **ALT** and **F3** keys together.
- Type a name for the Auto Text that will identify each entry say "WP".
- Click on **OK** button.


Create AutoText

Word will create an AutoText entry from the current selection.

Please name your AutoText entry:

WP

How to apply Auto text in the document

- Position the cursor where you want the contents of the Auto Text to appear.
- Type the name of the Auto Text say WP.
- Press **F3.**

Now we shall find the contents of AutoText i.e. Word processing will be automatically typed in the document .

Do it yourself

Create the Auto Text for the following text:

1. Yours faithfully
2. Yours truly
3. With kind regards
4. Thanking you

4.7 Mail Merge

Mail merge is a procedure, which allows the user to create a document and combine it with several different addresses. This is done when we want to send the same document to different people.

Utility of mail merge

Say in a community festival , you want to send a letter of invitation having the same contents to all your friends. You may have fifty friends. Normally, you had to type the letter fifty times, since the addresses of all your friends are different. This becomes a very tedious job. Instead of typing the letter so many times, we can use mail merge facility available with Ms-Word, i.e. type the letter once and combine this letter with fifty different addresses.

Thus with the help of Mail merge facility of word processing, invitation letters for your friends are very easily generated.

Let us now learn how to avail the mail merge facility.

Mail merge involves two types of documents.

1. **Main document**: This is the body of the letter that will be merged with several names and addresses as per the requirement.
2. **Data document**: This document consists of several names and addresses that is combined with the main document.

…………………▶

To

You are requested to attend the Spring Festival to be organised at our community hall on 20th of February,2001

Yours truly,
Raj

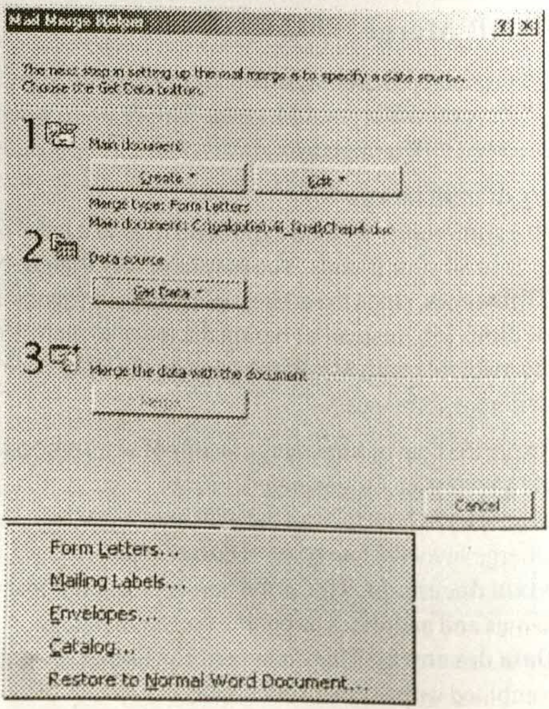
Main Document

1. Kuldip Singh, 22B ,Adarshanagar, Bhilai.
2. Manoj Bhandari ,45A/1B P.N Road , Kolkata
3. Rakesh Gupta, 71B,ABL Road , Mumbai
4. Prakash Jha ,11/1C, Bindhya Coloni, Mumbai
5. Rajen Bajpai,22A, Sector –V , Bokaro

Data Document

Steps for creating the Main document

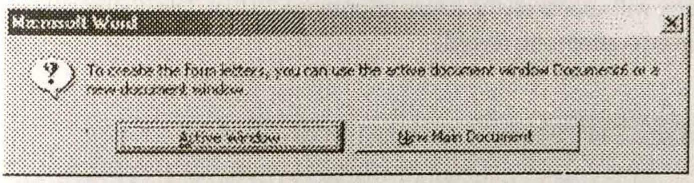
- Create a document.
- Save the letter in any name say, "Festival" in this case.
- Click on **Tools** menu.| Click on **Mail Merge.** The **Mail Merge Helper** dialog box will appear on the screen.
- Click on **Create** button under **Main document** menu.| Click on **Form Letters.**



The next step in setting up the mail merge is to specify a data source. Choose the Get Data button.

Merge type: Form Letters

- Click on the **Active window** button to make the "**Festival**" document as the main document.



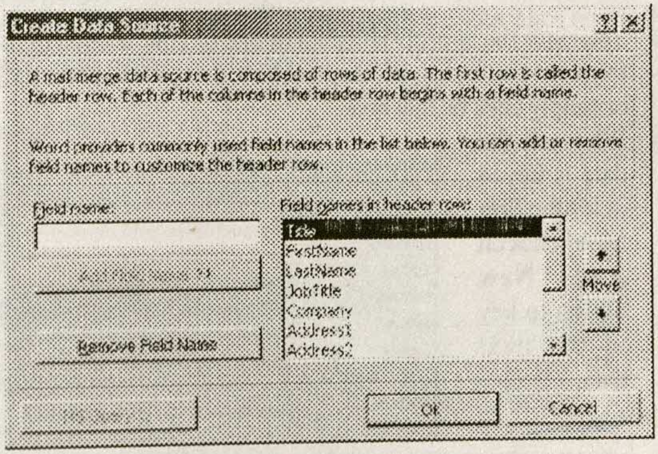
Procedure for creating the Data document

- Click on **Get Data** button. | Click on **Create Data Source** button.

You will find the **Create Data Source** dialog box will appear on the monitor displaying commonly used field names such as Title, First Name, Last Name, Company, Address1, Address2 etc.

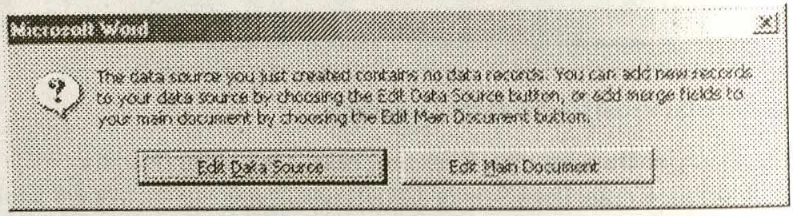
- Remove the fields that you do not want to use, by selecting them and then clicking on **Remove Field Name** button.

Similarly, you can add field names as per your requirement by keying the new field name in the **Field name** box.



- Click on **OK** button when you have finalised on the field names that you want to use.(In this case First Name, Last Name, Address1,City,State,Postal Code.)

- The **Save As** dialog box will appear on the screen. Give a suitable name in **File name** box and click on **Save** button to save the data document.
  A dialog box will appear on the screen informing you that data document you have already saved contains no records.

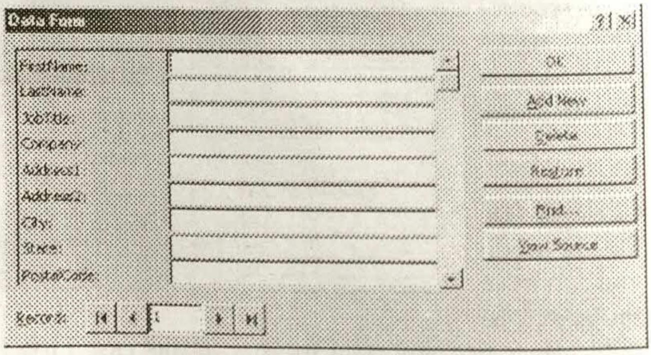


The data source you just created contains no data records. You can add new records to your data source by choosing the Edit Data Source button, or add merge fields to your main document by choosing the Edit Main Document button.

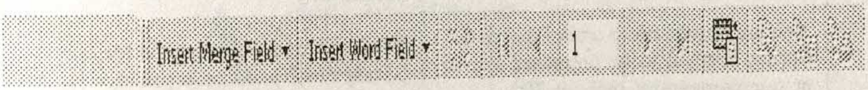
- Click on **Edit Data Source** button to add new records to the data document. The **Data Form** box will appear on the screen.

- You enter the appropriate data of one of your friends in the text box. To move from one text box to another text box, you have to press the Enter key or Tab key or simply click on that box.

- When all the data is keyed in for the first friend, click on **Add New** button to key in the next data.



- Once you complete the data entry of all your friends click on **OK** button to save all the records that you have entered. You will see a Toolbar will appear on the document screen. This toolbar is known as **Mail Merge Toolbar** and appears below the Formatting Toolbar.



Mail Merge Toolbar

Steps for merging the Main document with Data document

- Click on **Insert Merge Field** button on the Mail Merge toolbar.

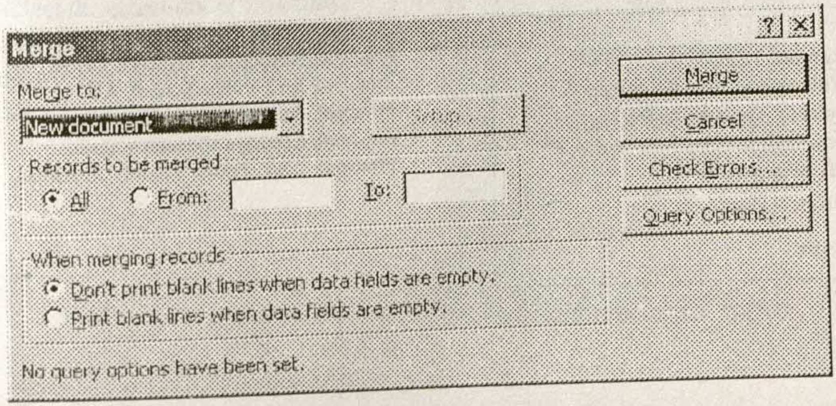
One has to specify where each field will appear in the final document.

Select the desired location in the main document in which you want to place the fields. From **Insert Merge field** pull down menu of the **Mail Merge Toolbar** select the desired field by simply clicking on it.

After inserting the desired fields, to merge the document with the data, click on **Mail Merge** command under **Tools** Menu. Then click on **Merge** button.

Merge dialog box will appear on the screen.

Now click on **Merge** button . Now you will see the main document has merged with the data document. You can see the samples of the two letters.



Merge to: New document

Records to be merged
● All ○ From: To:

When merging records
● Don't print blank lines when data fields are empty.
○ Print blank lines when data fields are empty.

No query options have been set.

To
Kuldip Singh,
22B ,Adarshanagar,
Bhilai.

You are requested to attend the Spring Festival to be organised at our community hall on 20th of February, 2001.

Yours truly,

Raj.

To
Manoj Bhandari ,
45A/1B P.N Road ,
Kolkata.

You are requested to attend the Spring Festival to be organised at our community hall on 20th of February, 2001

Yours truly,

Raj.

Do it yourself

Send the following letter to the Principals as shown below.

Respected Sir,
You are invited at the Power point Presentation on Ecology organised in our school on the 1st of January 2001.

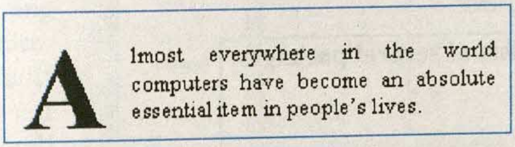
Yours sincerely,

Rajiv.

Principal, Navodaya Vidyalaya, Kerala
Principal, XYZ Public School, A.P
Principal, Indian Public School, M.P
Principal, Kendriya Vidyalaya, Delhi
Principal, DAV Public School, Rajasthan,

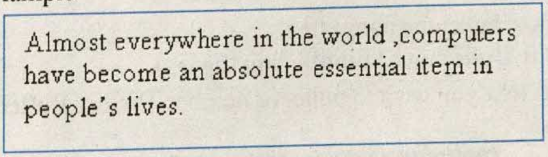
4.8 Drop Cap

In a daily newspaper frequently you must have seen that the first character of any specific sentence is in an enlarged fashion.



A lmost everywhere in the world computers have become an absolute essential item in people's lives.

How to obtain this effect?
With the help of Drop Cap feature we can bring this effect.
Try out the above example

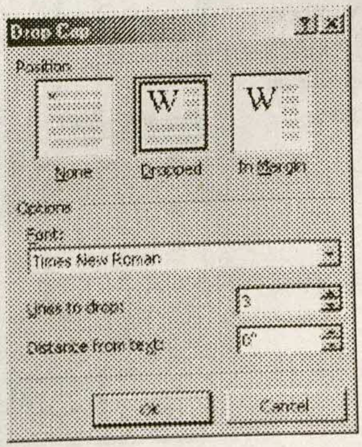


Almost everywhere in the world ,computers have become an absolute essential item in people's lives.

Procedure for applying the Drop Cap feature:

- ☺ Select the paragraph. | Select **Drop Cap** command under **Format** menu.
- ☺ Select the effect under **Position** .

You can also modify the presentation by changing the **Font, Lines to drop, Distance from text** option.



Font: Times New Roman

Lines to drop: 3

Distance from text: 0"

4.9 Bullets and Numbering

Bullets and numbering are an excellent way to represent important points or to emphasise lists of information.

Key in the following text:

Ms-Office consists of several packages:

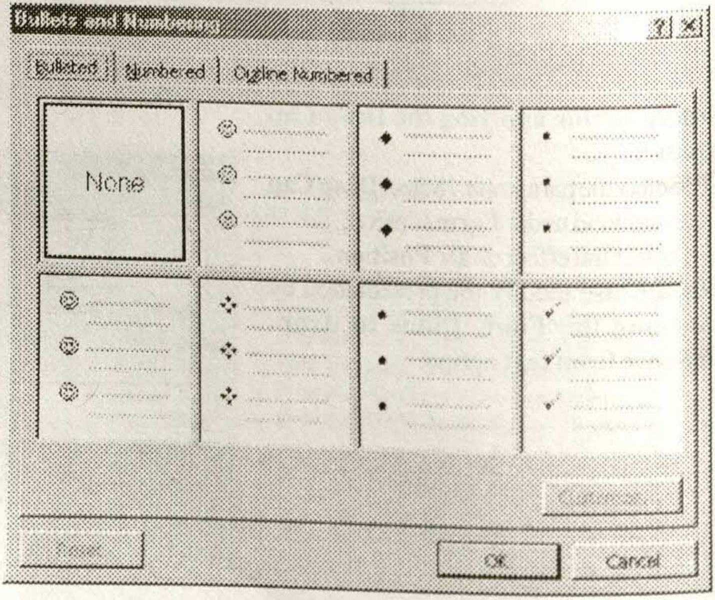
MS WORD
MS EXECL
MS POWER POINT
MS BINDER
MS OUTLOOK
MS ACCESS

Say, you want to bullet the above text.

Procedure for Bulleting or numbering the text.

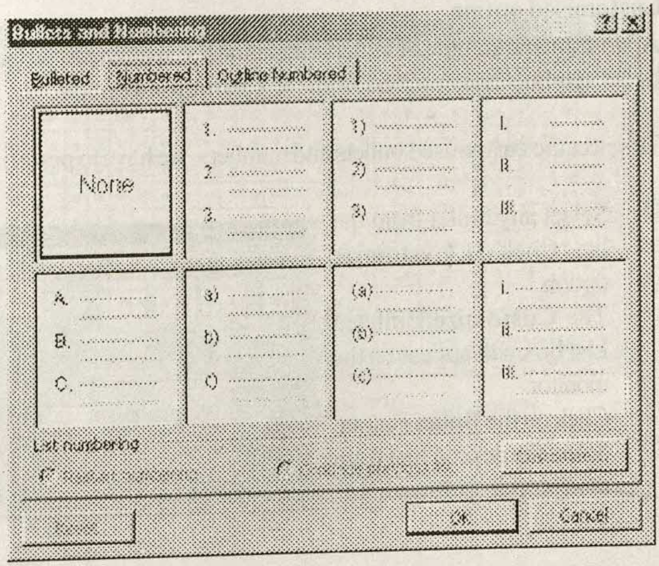
☺ Select the text you wish to bullet or number. | Select **Bullets and Numbering** command under **Format** menu.

The **Bullets and Numbering** dialog box will appear on the screen.



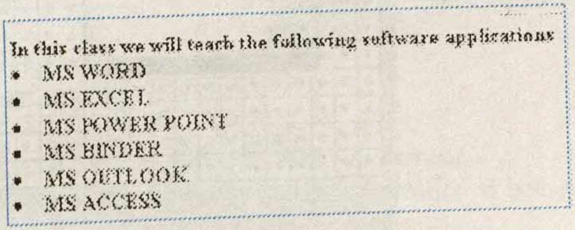
Bulleted Screen

- Select the **Bulleted** or **Numbered** option according to your choice. By default **Bulleted** screen will appear on the monitor. If you select **Numbered** option, numbered screen will appear on the monitor.
- Click on **OK**



Numbered Screen

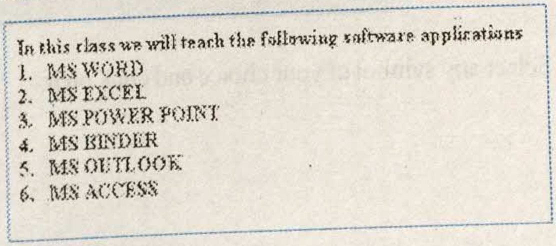
Example of a Bullteted Text



In this class we will teach the following software applications

- MS WORD
- MS EXCEL
- MS POWER POINT
- MS BINDER
- MS OUTLOOK
- MS ACCESS

Example of a Numbered Text



In this class we will teach the following software applications

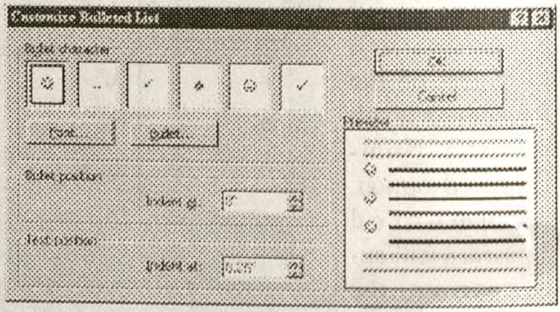
1. MS WORD
2. MS EXCEL
3. MS POWER POINT
4. MS BINDER
5. MS OUTLOOK
6. MS ACCESS

Customised option

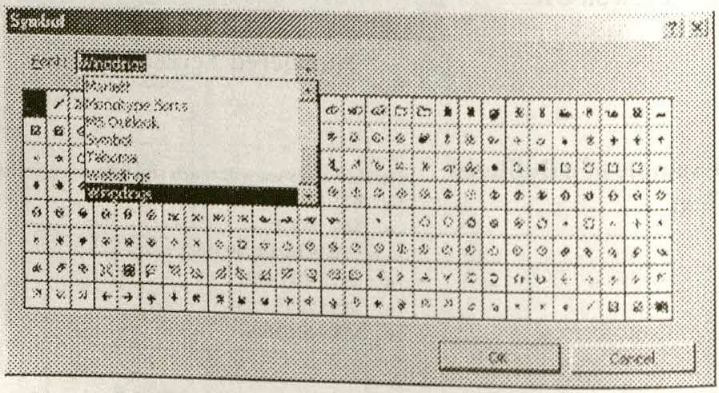
Apart from the sample of bullets and numbers , we can also select the different type of bullet symbols and numbers from the **Customised** option.

To select the customised bullets and numbers, we have to perform the following steps:

- Select any bullet from the list | Click on **Customize** option.
  The **Customize** Bulleted List box will appear on the monitor.
- Click on the **Bullet** Button.
- Select the desired font from the **Font** drop down list.

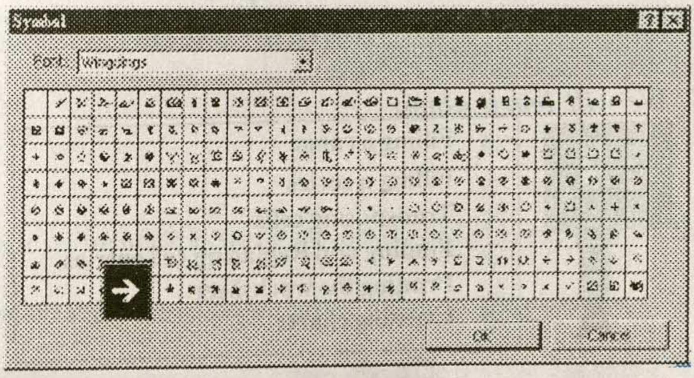


Let us select the Windings font from **Font** drop down list.

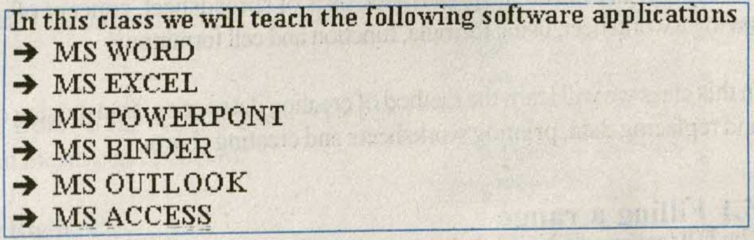


- Select any symbol of your choice and click on it.

Let us choose the **Right Arrow key** from the Windings font. Then the Right arrow key symbol is inserted in the bullet list.



Then we have to follow the earlier procedure to obtain following screen.



In this class we will teach the following software applications

- ➔ MS WORD
- ➔ MS EXCEL
- ➔ MS POWERPONT
- ➔ MS BINDER
- ➔ MS OUTLOOK
- ➔ MS ACCESS

Do it yourself

1. Number the students of your class according to their roll number.
2. Bullet the different subjects of the Computer Science (mentioned below) according to your choice.
   Office – 2000
   Adobe PhotoShop
   Corel Draw
   PageMaker
   C++ Language
   HTML
   Visual Basic
   Visual C++
   Visual Java

Chap: 5

More on Excel

We will learn about

- ☺ **Filling a range**
- ☺ **Filling a series**
- ☺ **Transposing cells**
- ☺ **Finding and Replacing cell entries**
- ☺ **Printing the worksheet**
- ☺ **Creating charts**

In the last class we have learnt about the different aspects of a worksheet which include the definition of spreadsheet, uses of spreadsheet, concept of cell address, saving a worksheet, using formula, function and cell formatting.

In this class we will learn the method of creating data series , transposing data, finding and replacing data, printing worksheets and creating charts.

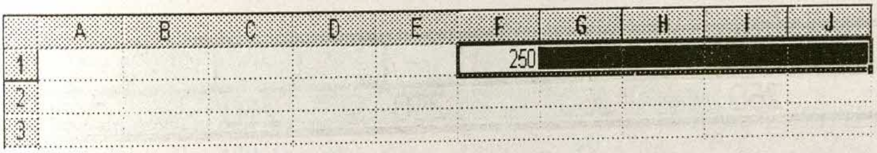
5.1 Filling a range

The **Fill** feature of EXCEL helps us in doing some repetitive jobs without using COPY and PASTE commands thereby saving our time and effort to a great extent.

The Fill command has certain additional and interesting features :

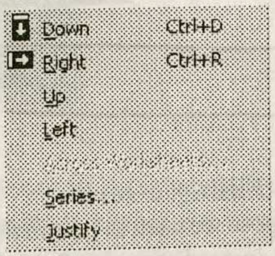
✓ It can copy a number or text to subsequent cells in upward, downward, left and right direction.

✓ It can generate different types of series very easily. These series include data with number, date, name of months(January, February, March, April etc.), days of the week (Sunday, Monday, Tuesday, Wednesday etc.)



In the above example say we would like to fill the content of F1 cell i.e.250 to the cells G1 through J1.
In order to perform the above operation we have to follow the given procedure:

- Select the source cell (in this case F1) from where the data (in this case 250) needs to be repeatedly filled up in the consecutive cells and select also the destination cells (in this case G1 through J1) where the data will be placed.



- Click on **Edit | Fill.** A drop down menu will appear on the screen as shown.

- Click on **Right.**

(You will find that the number 250 is automatically copied from F1 to the cells G1 through J1)

Alternatively we can also follow the given procedure :

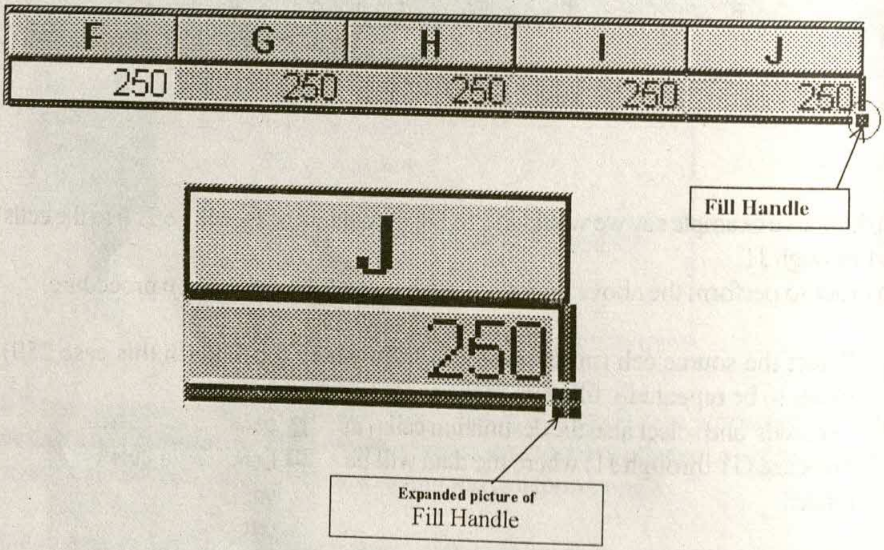
- Select a cell from where the data needs to be repeatedly filled up in the subsequent cells.

[In the given example say we would like to copy the contents of F1 cell i.e.250 in the cells G1 through J1.]

- Point to the **Fill Handle.** (Fill Handle is a little square on the bottom-right corner of a highlighted cell, which, when dragged changes to a + sign.)
- Drag the **Fill Handle** to the rightward direction i.e. F1 through J1.

[We can also drag the **Fill Handle** in the upward ,downward and left directions.]

☺ Release the mouse button. The contents of the highlighted cell will be copied to all the cells which were selected.



5.2 Filling a series

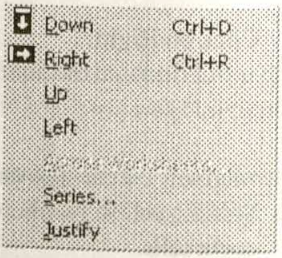
Suppose we want to type in the names of months of a year. Instead of typing the names of each of them we can do it in a easier way as shown :

☺ Type the name of the starting month.

Say, January in cell A1. (we can choose any month)

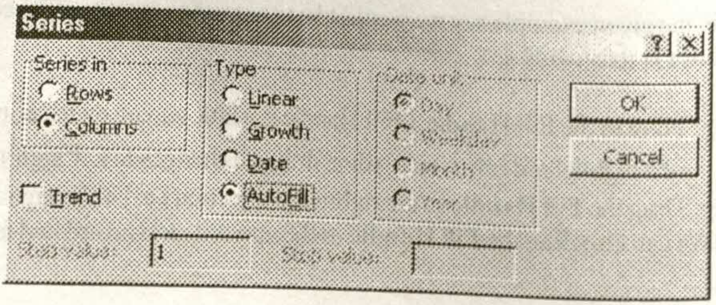
☺ Select the cells from A1 to A12.

☺ Click on **Edit** | **Fill**. A drop down menu will appear on the screen.



☺ Click on **Series.** The **Series** dialog box will appear on the screen.

☺ Click on **AutoFill**.



Series in: ● Columns

Type: ● AutoFill

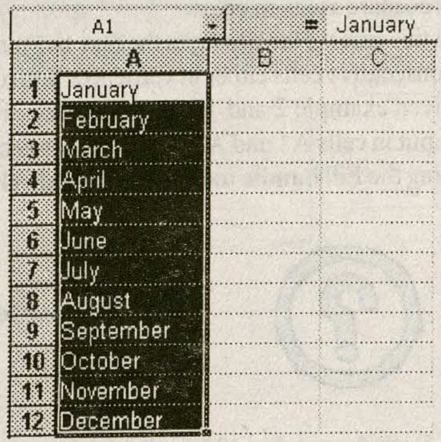
Step value: 1

Stop value:

You will find that names of the months from January to December are filled from the cell A1 through A12.

Alternatively to obtain the same result we can follow the procedure below:

- Type the name of the starting month i.e. January in cell A1.
- Click on the **Fill Handle** of the starting cell (A1).
- Drag the Fill Handle in the vertical or horizontal direction as preferred by you. We don't need to count the cells because as we drag, EXCEL will show us exactly which month we are on.
- Release the mouse button. The months of the year following the one you typed will be automatically inserted.



A1 = January

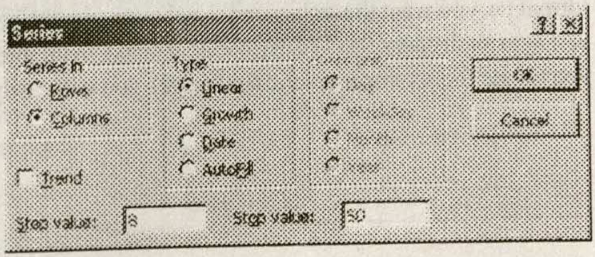
	A	B	C
1	January		
2	February		
3	March		
4	April		
5	May		
6	June		
7	July		
8	August		
9	September		
10	October		
11	November		
12	December		

Suppose we want to generate the series 2,10,18,26,34 upto 50 in a columnar fashion. You will notice that there is an interval of 8 units between two consecutive numbers. In order to generate this series we have to perform the following steps:

- Write down the initial value of the series i.e. 2 in the cell A1.
- Click on **Edit | Fill | Series.**

The **Series** dialog box will appear on the screen .

- Click on **Columns** option available under the **Series in** menu, since we want the series in Columnar fashion.
- Put the interval of the series in **Step value** box. (i.e. 8 in this case)
- Put the Final value in **Stop value** box. (i.e.50 in this case)
- Click on **OK.**



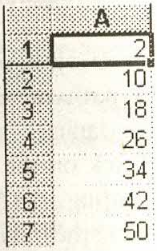
Series in: ● Columns

Type: ● Linear

Step value: 8

Stop value: 50

You will find that the series is automatically generated as shown in the figure.



	A
1	2
2	10
3	18
4	26
5	34
6	42
7	50

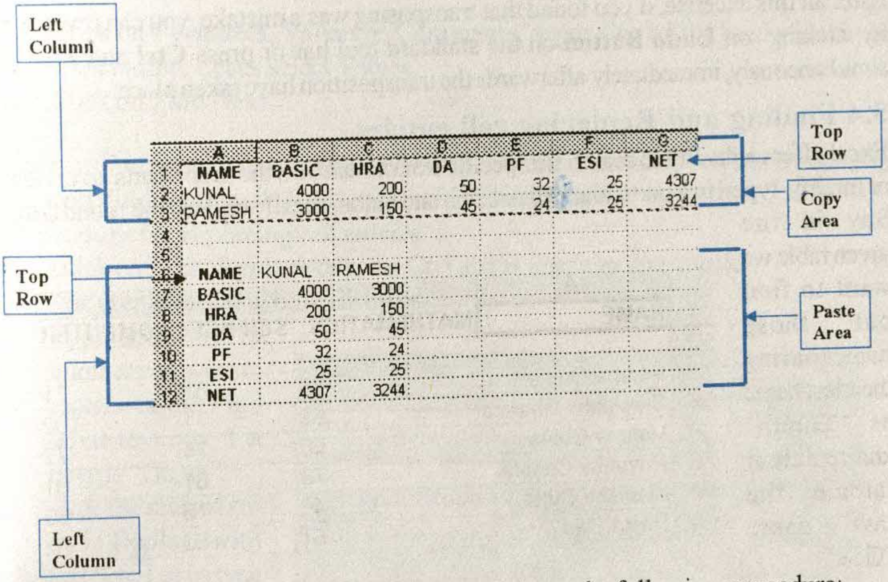
Alternatively to obtain the same result we can follow a different procedure as given below :
In this case we have to input the first two numbers of the series in consecutive cells either in vertical or horizontal direction. In the given example 2 and 10 are the consecutive values which we input in cells A1 and A2. We have to select these two cells and drag the **Fill handle** tool till the desired value i.e. 50 is reached.

Do it yourself

1.Copy the number 425 from A1 to the cells B1 through H1.
2.Copy the number 777 from F1 to the cells F2 through F10.
3.Create a series in a row having starting value 1900 , Stop value 2000 and Step value10
4. Generate a Series starting from April and ending in March.

5.3 Transposing Cells

Transpose means interchanging the order or location of data in the cells. Suppose you create a table with a specific format and later you feel you want to change the format i.e. you want the values in the columns should be placed in the rows and vice versa ;in such cases the **Transpose** command, available with **Excel** comes to use. If you notice the example (in the next page) you will easily understand the concept.



	A	B	C	D	E	F	G
1	NAME	BASIC	HRA	DA	PF	ESI	NET
2	KUNAL	4000	200	50	32	25	4307
3	RAMESH	3000	150	45	24	25	3244
4							
5							
6	NAME	KUNAL	RAMESH				
7	BASIC	4000	3000				
8	HRA	200	150				
9	DA	50	45				
10	PF	32	24				
11	ESI	25	25				
12	NET	4307	3244				

To obtain the transpose effect in Excel we have to use the following procedure:

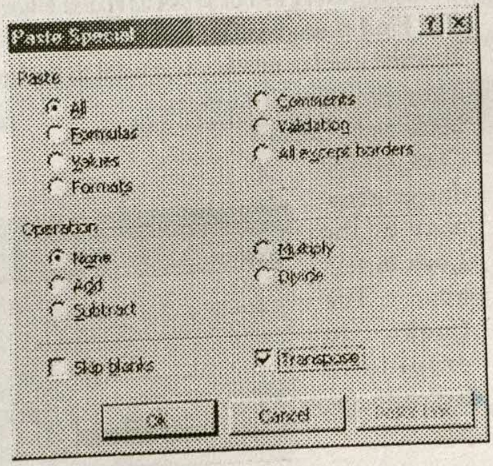
- ☺ Select the range of cells that you want to transpose.
- ☺ Click on **Edit | Copy** or Click on **Copy** Button on the **Standard Toolbar.**

Click on the cell that will form the top-left corner of the new range. The new range must be outside the selected area. (Copy Area)

- ☺ Click on **Edit | Paste Special**. The **Paste Special** dialog box will open.
- ☺ Click on **Transpose** checker box. A tick mark will appear in the box.
- ☺ Click on **OK**.

The entire table is displayed in the new location (Paste Area) with rows converted to columns, and columns to rows.

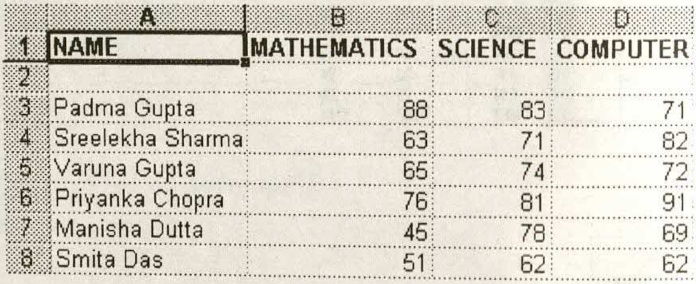
- ☺ Press the **Esc** Key. The marquee around the original selection will be turned off.



After all this excerise, if you found that transposing was a mistake, you can reverse it by clicking on **Undo Button** on the standard tool bar or press **Ctrl** and **Z** keys simultaneously, immediately afterwards the transposition have taken place.

5.4 Finding and Replacing cell entries

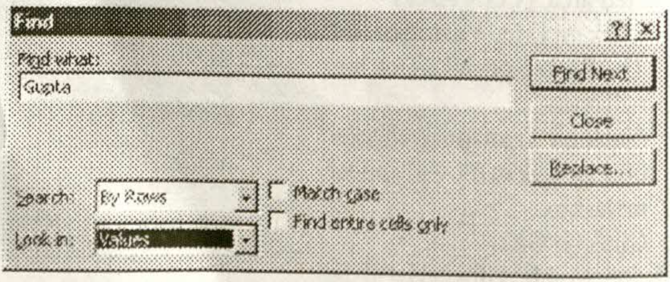
Excel offers a facility to search for specific text or numbers the user wants to review or modify, typed in a particular cell or cells, and automatically replace the found data. Say in the given table we want to find out those names having their last name as "Gupta" and replace it later by the last name "Goel".



	A	B	C	D
1	NAME	MATHEMATICS	SCIENCE	COMPUTER
2				
3	Padma Gupta	88	83	71
4	Sreelekha Sharma	63	71	82
5	Varuna Gupta	65	74	72
6	Priyanka Chopra	76	81	91
7	Manisha Dutta	45	78	69
8	Smita Das	51	62	62

Procedure for finding cell entries

- Click on **Edit | Find** or press **Ctrl** and **F** keys simultaneously.
  The **Find** dialog box will open.
- Type the word or number you want to find in the **Find what** text box. Be sure to type it exactly as in the sheet.
  Let us type "Gupta".
- Click on the down arrow next to the **Look in** text box. The **Look in** drop-down list will appear.



Find what: Gupta

Search: By Rows

☐ Match case

☐ Find entire cells only

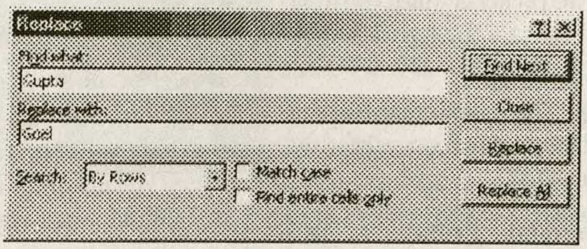
Look in: Values

- Click on **Formulas**, **Values** or **Comments**, depending on the kind of data you want to find. Let us select **Values.**
- Click on **Find Next**.

Excel will find the first occurrence of the typed word or number. You can continue to click on **Find Next** until all occurrences have been found.

Procedure for replacing cell entries

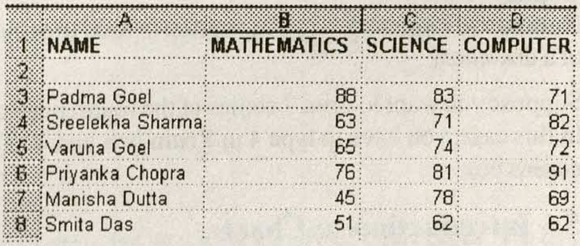
1. Click on **Edit | Replace** or press **Ctrl** and **H** keys simultaneously. The **Replace** dialog box will open.
2. Type the word or number you want to replace in the **Find what** text box. Let us type "Gupta".
3. Type the revised entry in **Replace with** text box. Let us type "Goel".



Find what: Gupta
Replace with: Goel
Search: By Rows

[At this point, if you click on **Replace All** option, you will find that all the occurrences of the original entry i.e. "Gupta" is replaced by the revised entry i.e. "Goel". This procedure may not be used if you want to replace one or some specific data with a modified one. In that case replacing data one by one would be a wiser decision.]

4. Click on **Find Next**. Excel will find the first occurrence of the typed word or number. (In this case Gupta)

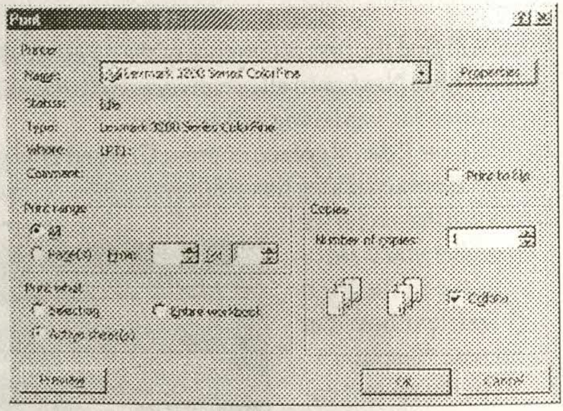


	A	B	C	D
1	NAME	MATHEMATICS	SCIENCE	COMPUTER
2				
3	Padma Goel	88	83	71
4	Sreelekha Sharma	63	71	82
5	Varuna Goel	65	74	72
6	Priyanka Chopra	76	81	91
7	Manisha Dutta	45	78	69
8	Smita Das	51	62	62

5. Click on **Replace.** In this case "Gupta" will be replaced by "Goel".
6. Click on **Find Next**. Excel will find the next occurrence of the typed word or number.
7. Repeat step 4 and 5 until you have checked all occurrence of the typed word or number in the worksheet.
8. Click on **Close**. The dialog box will close.

5.5 Printing the worksheet

- ☺ Click on **File | Print**
- ☺ Click on **OK.** The document which is presently open will be printed.



You can see several options in **Print** dialog box. We will discuss about the options, which will be used by you.

Printer

Name : It will display the name of the printer in which you want to print.

Print range :

All : This option is used to print all the pages of currently active document.

Pages(s) From ☐ **To** ☐

With the help of this option we can print specified range of pages, of currently active document. Suppose you want to print the pages from 3 to 7 of a document. In this case you have to type in 3 in **From** box and 7 in **To** box.

Copies

Number of copies ☐ : This option is used to print number of copies of a page of a document.

Suppose you want to print 7 copies of the fourth page of a document.
In this case, you have to type 4 in **From** box and 4 in **To** box and 7 in **Number of copies** box.

5.6 Introduction to Chart

Charts are an excellent method to present data in a powerful way. If we want to make sure that our data is understood we should present it with the help of illustration. Although a simple table is not difficult to understand ,but the implication of numeric data is better comprehended if presented with the help of a chart.Quarterly sales report of a company, scientific data, hourly/monthly temperature charts, examination marks in a subject of a class and innumerable other types of data look meaningful when converted into charts.
With the help of MS EXCEL we can link charts to the data so that if the data undergoes any modification the chart automatically gets modified. Different type of chart options are available with MS-EXCEL having different utility values in various presentations.

To create charts, the primary input that we need is data. A typical worksheet in Excel that represents various relationships can be depicted in the form of a chart quite easily.

If we have the data arranged in a tabular format, we can readily change it into a chart. It is even easier if we label the rows and columns containing the data.

Excel offers several options to the user for selecting an appropriate chart vis-a-vis the type of data. First we select the range of the data from the worksheet. Then we can press F11 to get a new chart. or we can also click on the **Chart Wizard** icon, or Click on the **Insert** Menu | **Chart** to create a new chart. This is the easiest way to create charts.

Spreadsheet application lets us visualise data as a picture. Sometimes it is easier to understand numbers when they are in form of an illustration. The illustration we make from numeric data is called a **graph**.

Spreadsheet can create pie charts, bar graphs, line graphs and many more, types of charts. We shall learn about the frequently used ones in this class. Pie charts make the data look like pies, bar graphs make the data look like bars, and line graphs presents the data as lines.

When to use various chart types ?

The chart type we select depends on the kind of data we are trying to graph, and the way in which we want to represent it. Here's a list of the major chart types Excel offers:

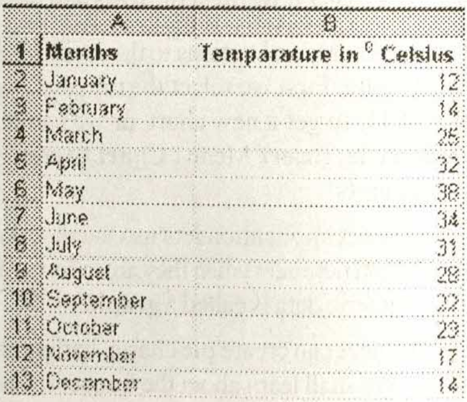
As we can see, some of the most commonly used chart types are:

- ✓ Column
- ✓ Bar
- ✓ Line
- ✓ Pie
- ✓ Area

As we have already seen, Excel provides us with a variety of chart types. We can choose the type of chart according to the data we want to represent with the chart. For example, when we want to show the break up of a data, it is best to use the Pie chart. Say, the quantities of each component in a mixture, the percentage of Indians, Americans, Africans, Australians, others present in USA are examples of data to be presented through Pie chart. Bar charts and column charts are good for representing variation in quantities, such as temperature, sales amounts, aggregates etc. Line charts are used when we want to interpolate between two data two points, like in scientific experiments. Three dimensional charts are used for complicated data that we want to view from different perspectives.

Let us discuss about the line graphs :

Utility of Line Graph: Line graphs are used to show trends or changes over time. They can have one, two, or many lines. Each line represents a specific type of data.



	A	B
1	**Months**	**Temparature in ⁰ Celsius**
2	January	12
3	February	14
4	March	25
5	April	32
6	May	38
7	June	34
8	July	31
9	August	28
10	September	22
11	October	23
12	November	17
13	December	14

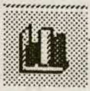
Now we will discuss how to create line graphs.

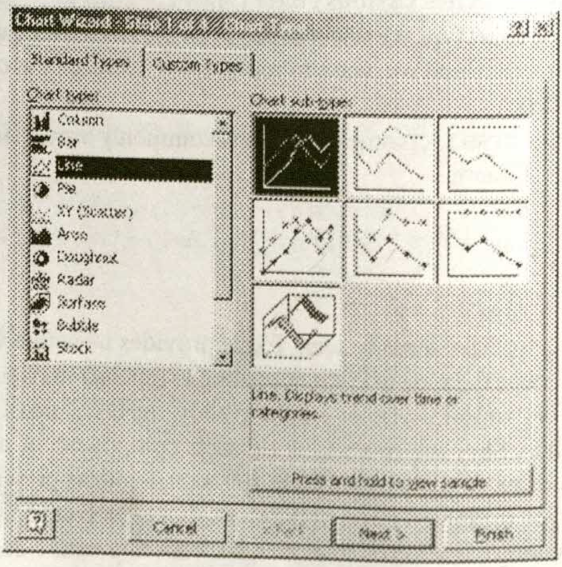
Here is a table of data that shows variation of maximum temperature in a city in twelve months.

In order to create line graphs we have to perform the following steps:

- Enter the data in your worksheet as shown in the adjacent table.

You will find the **Chard Wizard Icon** on the Standard Tool bar



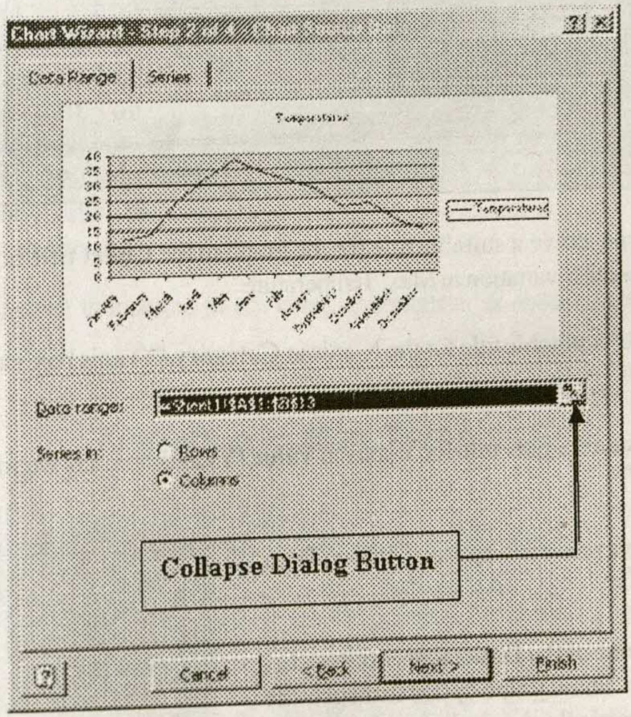


Line. Displays trend over time or categories.

- Click on **Chart Wizard Icon** or click on **Chart** command under **Insert** menu. The **Chart Wizard - Step 1 of 4** dialog box will open.
- Click on the **Standard Types** tab.
- Click on **Chart type**. Let us select the **Line** option.
- Click on an option in the **Chart Sub-type**. Let us select the first one.

- Click and hold down the mouse button on the **Press and hold to view sample** button. You will be able to see what your data will look like if you choose a particular chart type. Release the mouse button when you have finished viewing.
- Click on **Next.** The **Chart Wizard - Step 2 of 4** dialog box will open.

If you selected your data range before clicking on the **Chart Wizard**, the data will appear in the data range. You can change the selected data range by typing a new range or by clicking on the **Collapse Dialog** button from the dialog box. Select the range in the worksheet and then click on the **Expand dialog** button from the dialog box to return to the wizard.



- Click on **Next.** The **Chart Wizard - Step 3 of 4** dialog box will open.
- Click on the **Titles** tab.

The Titles option allows us to insert the title / caption to the chart, X-axis and Y-axis to make the chart more informative.

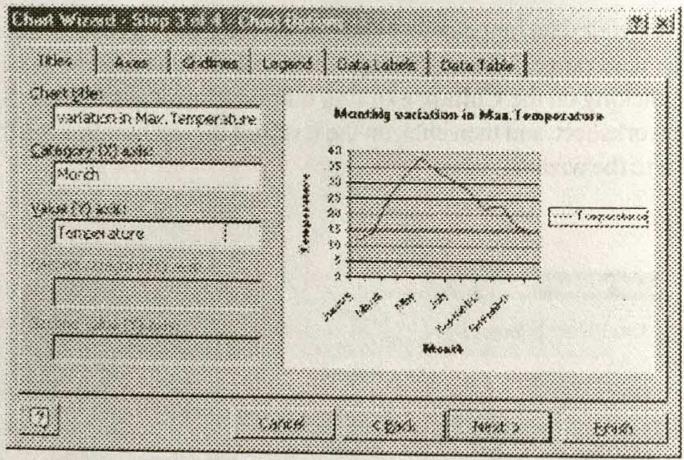


Chart title: variation in Max. Temperature
Category (X) axis: Month
Value (Y) axis: Temperature

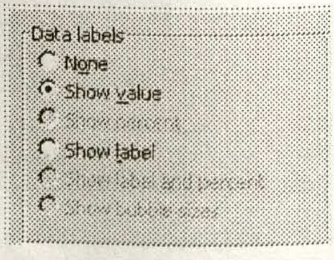
- Let us write down a suitable title for the graph in the **Chart title** box. Say we write "Monthly variation in Max. Temperature".

- Let us give a suitable title for the X-axis in **Category (X) axis** box, say we write "Month."

- Let us give a suitable title for Y-axis in **Value (Y) axis** box. say we write "Temperature."

- Data labels menu will appear. Click on **Data Labels** Tab.

- Click on one of the **Data labels** options. Let us choose **Show value** option to display the actual numerical value for line.



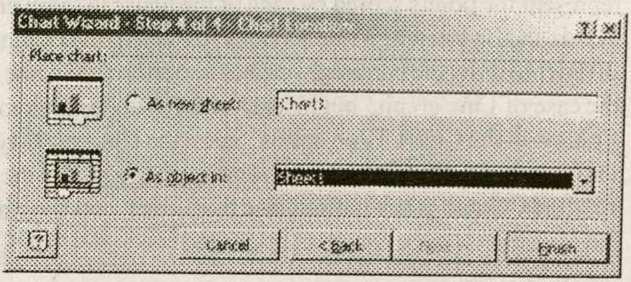
Data labels
○ None
● Show value
○ Show label

- Click on **Next** button. The **Chart Wizard - Step 4 of 4** dialog box will open.
- Click on **Finish** button.

There are two options in **Place chart**

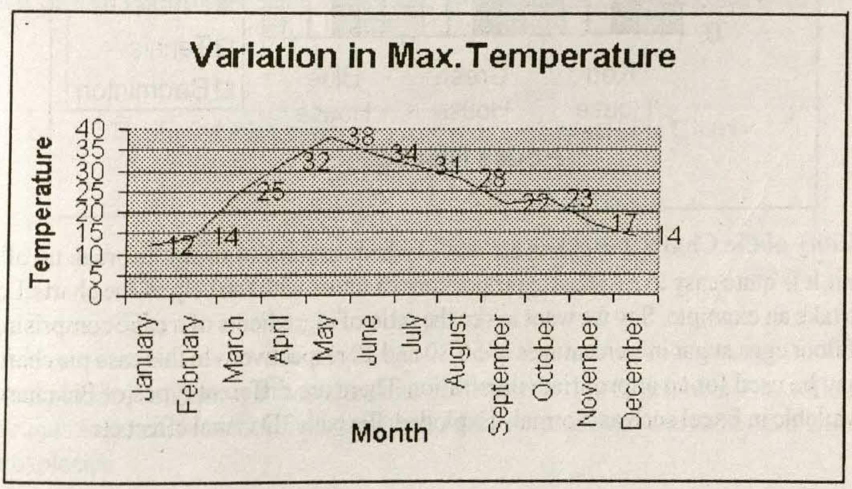
A. Click on **As new sheet** if you want to create your chart on a new worksheet.

B. Click on **As object in** if you want to add it to the same worksheet that contains the data, so that you can print both the data and the chart on the same page.



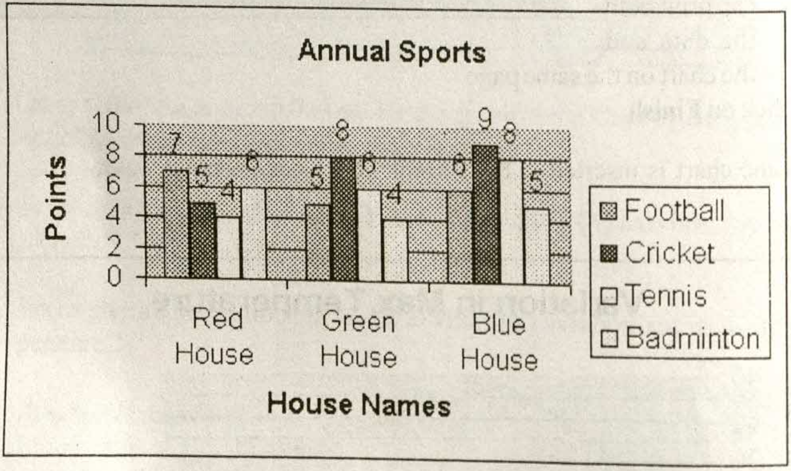
- Click on **Finish.**

The Line chart is inserted in the current worksheet as shown below.



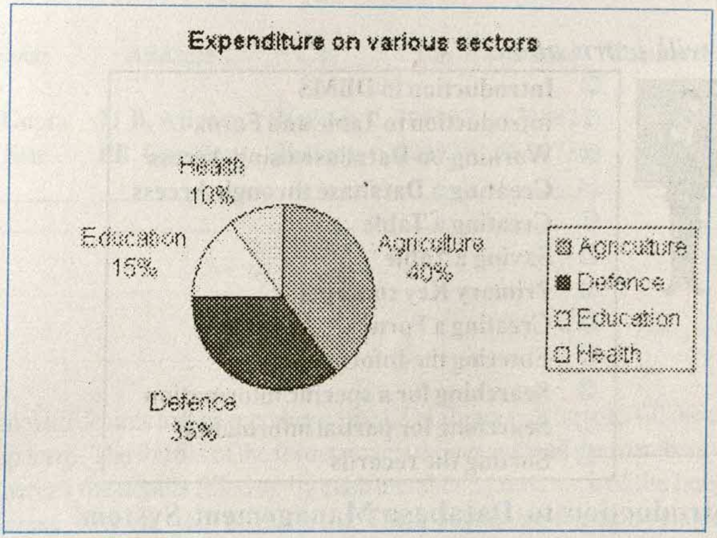
We can move or copy this chart to a different application, like the word processor and paste it there within the document. This allows us to share information between applications and minimize our working time.

Utility of Bar graph: Bar graphs are used to compare values. The bigger the value, the bigger the bar, so it is easy to make comparisons.
Suppose, in a school there are three houses such as Red, Green and Blue, and each of the students belong to any one of these houses. We have to draw a graph which will represent the points scored by each of the house in the events of Football, Cricket, Tennis and Badminton, in the School's Annual Sports Competition.
In order to draw the bar graph one has to perform the same steps as we followed in the case of Line graph, but instead of selecting Line graph, we have to select the Column in the **Chart Type** option. Select the **Chart sub-type** (Suppose you select the first option). Perform the same steps as we followed in the case of the line chart. You will find Column graph is inserted in the current worksheet as shown in the figure.

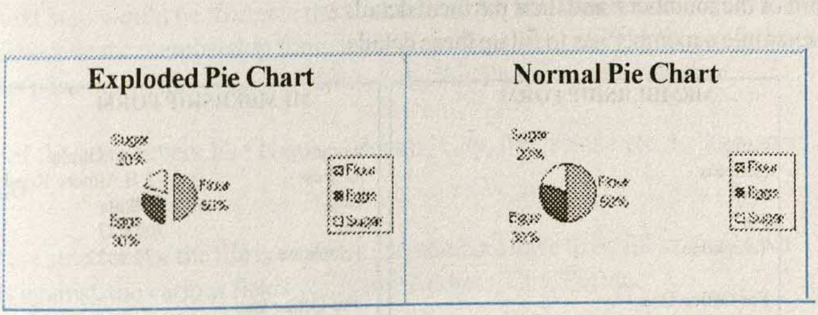


Utility of Pie Chart : Pie charts are useful when we want to show the break up of a unit. It is quite easy to emphasise proportions or ratios with the help of Pie charts. Let us take an example. Say we want to see the ratio of ingredients of a cake comprising of flour, eggs, sugar in percentages of 50, 30 and 20 respectively. In this case pie charts may be used for an appropriate illustration. There are different types of Pie charts available in Excel such as Normal, Exploded, Pie with 3D visual effect etc.

Pie charts can also be understood with another example. Financial expenses are usually expressed with the help of Pie graphs. The different expenditures are expressed as percentage of a whole, taken as a unit.



Thus, in order to draw the pie chart you have to perform the same steps as we followed in the earlier case but instead of selecting Column graph in **Chart type** option, you have to select the Pie chart. Select the **Chart sub-type** (Suppose you select the first option). Perform the same steps as we followed in the case of the line chart.



Exploded Pie Chart

Normal Pie Chart

An exploded Pie Chart is almost the same as the Normal Pie Chart, where the various portions /segments constituting a specific data are isolated from each other as if under an explosion.

Chapter : 6

Learning Database through Access

We will learn about

- **Introduction to DBMS**
- **Introduction to Table and Form**
- **Working on Database using Access**
- **Creating a Database through Access**
- **Creating a Table**
- **Saving a Table**
- **Primary Key concepts**
- **Creating a Form**
- **Entering the Information**
- **Searching for a specific information**
- **Searching for partial information**
- **Sorting the records**

6.1 Introduction to Database Management System

A **Database Management** software is an application software for storing and retrieving information. Let us understand the concept of a database from an example, say we have a CD library in our neighbourhood, where the various people can borrow CD's for viewing in their home computer by becoming members of the library.

Now to become a member of the library, one obviously has to fill up a membership subscription form for the benefit of the Library owner who can thus maintain a detailed record of the members and their payment details.

For example a member has to fill up these details:

MEMBERSHIP FORM

Name :
Address :
City :
Pin :
Telephone :

For Office Use :

Membership No. :

MEMBERSHIP FORM

Name : Rohan Gupta
Address : 71 B Alipore Road
City : Kolkata
Pin : 700 027
Telephone : 479 9822

For Office Use :

Membership No. : 0012

Now the CD librarian will have to create and maintain a database so that he is able to find out the information about the members at a glimpse. This database can be maintained either manually or through the help of a computerised database.

Sl. No.	**Name**	**Address**	**City**	**Pin**	**Phone**	**Membership No.**
1.	**Rohan Gupta**	**71 B, Alipore**	**Kolkata**	**700027**	**4799822**	**0012**
2.	**Sarita Sen**	**8B, Gariahat**	**Kolkata**	**700029**	**5556789**	**0013**
3.	________	________	________	______	______	______
4.	________	________	________	______	______	______
...	....	....	....	....	....	....
...	....	....	....	....	....	....
100.	....	....	....	....	....	....

Each person who desires to be a member of the CD Library will have to fill the above membership form. The format of the form remains the same for all the members of the Library, whereas the details filled up by each member against each of the items i.e. Name, Address, City etc. will be different. These details are the data related to a specific database.

All membership subscription forms will be kept together which will be the database of the CD library owner as a manual database. If the library owner has a computer he can store the database in the computer in the form of a file.

The next step would be to create the structure of the file, which forms the various parameters on the membership form. In this case the structure of the file would be the various parameters like Name, Address, City, Pin, Phone etc. put together.

Each of the parameters like Name, Address, City, Pin, Phone etc. is known as a **FIELD**.

After the structure of the file is created , the members have to be fill up their own details against the various fields viz. Name Address, City, Pin etc.

Thus there would be as many records in the file as there are members in the CD Library.

	CD Library Membership Form		**R**
Field 1	**Name**	: Robin Gupta	**E**
Field 2	**Address**	: E111, Gandhi Colony.	**C**
Field 3	**City**	: New Delhi	**O**
Field 4	**Pin**	: 110 048	**R**
Field 5	**Phone No.**	: (011) 623 3754	**D**

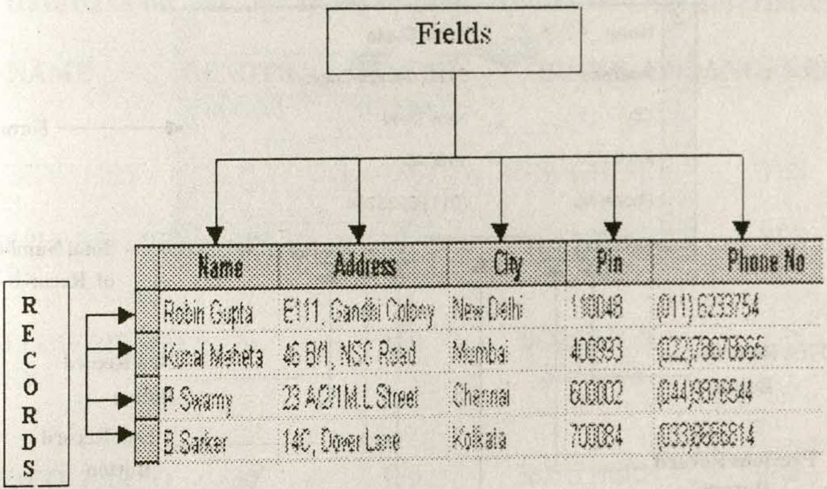
In the example given, the Name (Field 1), Address (Field 2), City (Field 3), Pin (Field 4) Phone No (Field 5) form the individual **Fields** in a database while all the fields constitute the **Structure** of the database. When information is provided for a particular member we call it as a record. A database may constitute of thousands of records.

6.2 Introduction to Tables and Forms

There are three important aspects in a database i. **Tables** ii. **Forms** iii. **Reports**. **Tables** are used to store information, **Forms** are used to view and edit information while **Reports** are used to display and print information. In this class we will learn about Table and Form.

Table

A computer database is similar to a table of information. Each row in a table is referred to as a "**Record**". Each record is a complete set of related data items, whereas each column in the table is referred to as a "**Field**". Fields are spaces reserved for specified data.



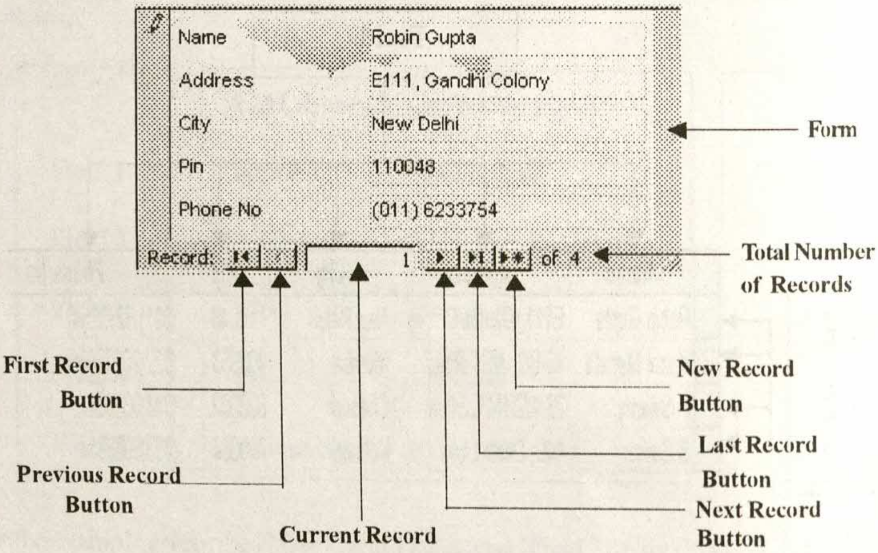
Name	Address	City	Pin	Phone No
Robin Gupta	E111, Gandhi Colony	New Delhi	110048	(011) 6233754
Kunal Meheta	46 B/1, NSC Road	Mumbai	400993	(022)78676665
P. Swamy	23 A/2/1 M.L Street	Chennai	600002	(044)9876544
B.Sarker	14C, Dover Lane	Kolkata	700084	(033)6666814

Form

With the help of forms the user can make the database easier to read. A Form is a card like window that shows each database record one by one. The form has spaces for each field. It also has a set of arrows at the bottom that let you go from one record to the next. That is, if you are looking at the first record, and you click the right arrow button, it will move to the second record. Push the arrow again and it will move to the third record and so on. The user finds it easier to work with forms than with tables, because forms look more like traditional paper database cards.

There are five navigation buttons for moving around in forms such as :

- ✓ First Record Button
- ✓ Previous Record Button
- ✓ New Record Button
- ✓ Last Record Button
- ✓ Next Record Button



Name	Robin Gupta
Address	E111, Gandhi Colony
City	New Delhi
Pin	110048
Phone No	(011) 6233754

Record: 1 of 4

A Form only allows the user to see one record at a time. If one wants to see more than one record at a time, he can use the table view rather than the form view. Viewing the records through the table, may look difficult to read , but it does enable the user to get a quick look at the list of records .Whereas viewing records through the form the user can concentrate on a single record while working.

6.3 Working on a database using Access

Let us start working on a database using Access. Suppose you want to carry out a study on various species of birds,trying to learn about their characteristics like weight, size ,whether they are endangered species or not etc., you have to maintain a database through which you can store the entire data and retrieve exact information whenever you require. Let us create a database with the given data and learn to manipulate the data.

A database on various types of birds and their characteristics

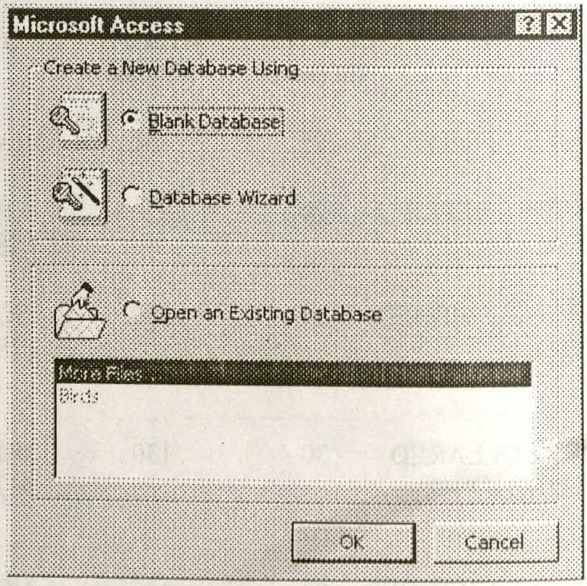
NAME	LENGTH (in cms)	WEIGHT (in gms)	ORIGIN	ENDANGERED
DUSKY LORY	25	156	NEW GUINEA	YES
PURPLE BELLIED LORY	28	220	PAUPAN ISLANDS	YES
YELLOW BIBBED LORY	24	150	SOLOMON ISLANDS	YES
RED COLLARED LORIKEET	30	130	NORTHERN AUSTRALIA	NO
ORANGE WINGED AMAZON	33	160	NORTHERN COLOMBIA	NO
GREEN WINGED MACAW	90	400	NORTHERN COLOMBIA	NO
PAINTED CONURE	23	55	VENEZULEA	YES
ECLECTUS PARROT	37	375	AUSTRALIA	YES
SPLENDID GRASS PARRAKEET	21	40	SOUTHERN AUSTRALIA	NO
PESQUET'S PARROT	50	700	NEW GUINEA	YES

6.4 Creating a new database in Microsoft Access

- Click on **Start** button | **Microsoft Access. Access Start-up** window will appear on the screen. There are two ways to create a new database in Access.

- Using **Blank Database** (i.e. manually)

- Using an appropriate wizard from the **Database Wizard.**



Create a New Database Using

● Blank Database

○ Database Wizard

○ Open an Existing Database

Birds

Both approaches have their merits. The manual method provides more precision. One can create a blank database and then include the necessary components over a period of time. This method gives the user a complete control over his database composition.

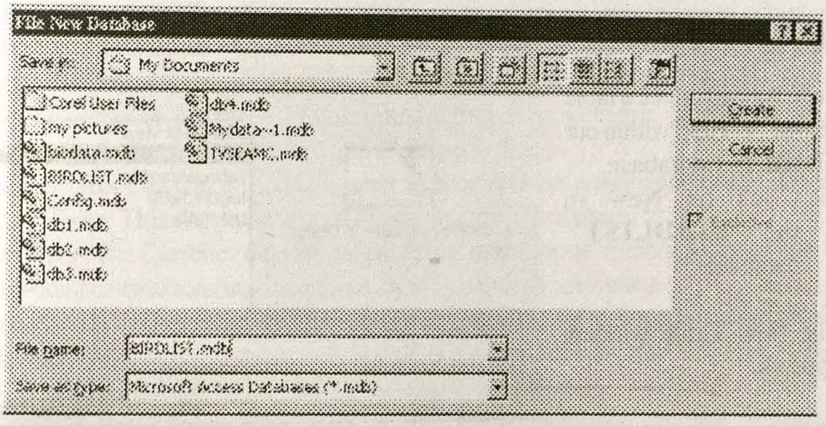
The wizard method on the other hand is much easier to use, very convenient and effective. Database wizard lets the user choose the overall form background, overall database title, include specific tables and fields and specify report styles.

Creating a database using Blank Database

In order to create a new database, we have to perform the following steps:

- Click on **Blank Database**
- Click on **OK**

The **File New Database** window appears on the screen.
The database window allows you to give a name to the database.



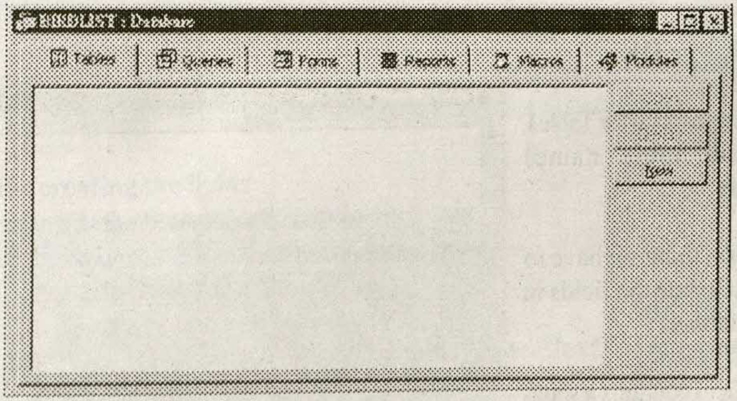
Save in: My Documents

File name: BIRDLIST.mdb

Save as type: Microsoft Access Databases (*.mdb)

It also lets you specify the folder in which it will be created.

- ☺ Write down the file name say "BIRDLIST" in **File name** box.
- ☺ Click on **Create.**



The "BIRDLIST" **Database** window appears on the screen.

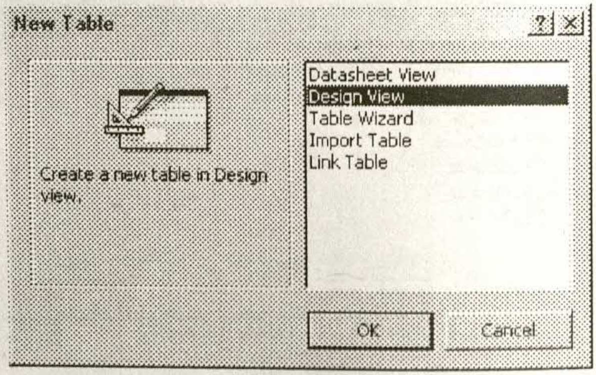
The access database is created with a name "**BIRDLIST. mdb** "
[When a database is created it automatically takes an extension **.mdb**; where mdb stands for microsoft database]

6.5 Creating a Table

Now, we will create a table named **"Birds"** within our **BIRDLIST** database.

- ☺ Click on New in the "**BIRDLIST**" database.

The **New Table** window appears.



Create a new table in Design view.

There are several options to create tables **Datasheet View**, **Design View**, **Table Wizard**, **Import Table** and **Link Table**. Let us learn, the simplest way to create a table through **Design View** option.

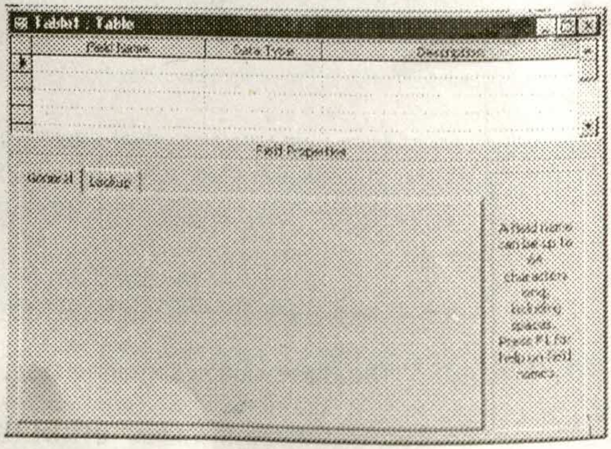
- ☺ Click on to select **Design View.**

- ☺ Click on **OK.**

The design menu for Table1 (default table name) appears.

The first thing we have to do is to name the fields in the database.

Each field contains a separate category of information.



After you create a field, you have to decide the Data Type of the specified field.

There are several data types available in MS ACCESS database for eg. Text, Memo, Number, Date/Time, Currency /Auto Number, Yes / No etc.

Text :We can use Text field for storing text ,numbers and combination of text and numbers, which do not require calculations to be performed on them (for example Name, Phone numbers, Address etc.). This field can store up to 255 characters.

Memo: This data type is used for storing text and numbers with up to 64,000 characters. This data type is used for detailed and descriptive fields.

Number: This data type is used for storing numeric data that can be used for calculations.

Data / Time: This data type is used for storing dates and times.

Currency: The Currency data type is useful for calculations involving money and for fixed-point calculations in which accuracy is particularly important.

Auto Number: This data type, stores sequential number for each record automatically.

Yes / No: This data type stores only one of two values such as Yes / No, True / False, or On / Off.

OLE Object: This data type stores objects created in another application such as Word, Excel etc. that we can link to or embeded in an access table.

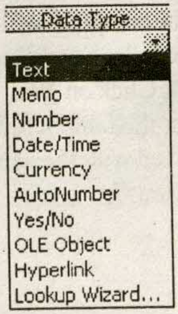
Hyperlink: This data type stores a link to a UNC or URL , such as web page on the World Wide Web.

Lookup Wizard: This data type stores a lookup column that we can use as a lookup in another table.

Description: This field description is optional . It helps the user to describe the fields and is also displayed in the status bar when you select this field on a form.

Steps for creating the fields

- Click inside the box under **Field Name**
- Give the name of the first field as NAME
- Click inside the box under **Data Type**



The word "**Text**" is highlighted. Select the data type as "Text" since the names of birds always consist of alphabet.

We have created first field . Now let us create the second field.

- Click inside the box under **Field Name.**
- Give the name of the second field as LENGTH (in cms).
- Click inside the box under **Data Type.**

By default we will find the word "Text" is displayed. Click on the down arrow sign to view the drop down list. You have to select the **Number** data type from drop down list since the information that you will store in the "Length" field, is of numerical type of data.
Similarly we can create other fields of the Table such as WEIGHT (in gms) (Data type : Number), ORIGIN (Data Type : Text) , ENDANGERED (Data Type : Yes / No), with the help of the above mentioned procedure.

After entering the all the field names, we have to save the table consisting the field names. Unless we save the table, it will only exist in the computer's temporary memory. If the computer shuts down without saving the table , the table will be erased from the memory .To store the table permanently in the hard disk the user has to save the table with a convenient name so that it can be located later easily.

6.6 Saving a Table

☺ Click on **Save** command under **File** menu.

The **Save As** dialog box will appear on the screen. Since you have not saved the table before, you have to give it a name. You will find that **Table1** already exists as default table name.

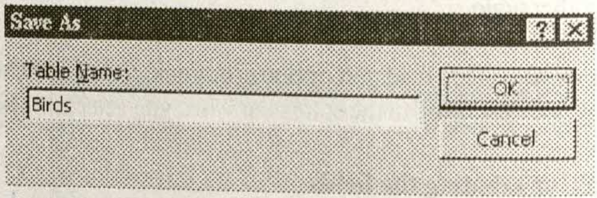


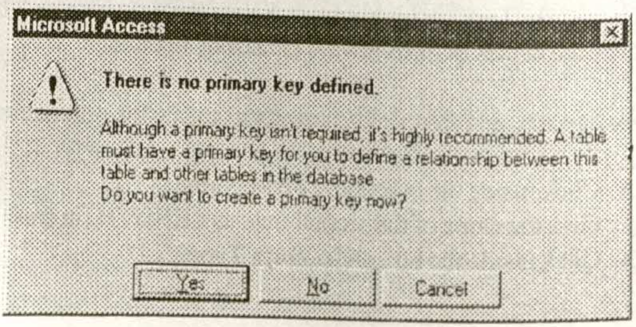
Table Name: Birds

☺ Delete "**Table1**" and type "**Birds**" in the **Table Name** box.

The computer will ask if the user wants to create a "primary key" in the database by the following dialog box.

☺ Click on **Yes.**

So, the table will be saved with the name "Birds".



There is no primary key defined.

Although a primary key isn't required, it's highly recommended. A table must have a primary key for you to define a relationship between this table and other tables in the database.
Do you want to create a primary key now?

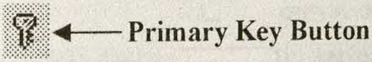
6.7 Primary Key

A primary key is a field that is common to each record which identifies it as being unique. Access uses this key to relate a table's records to those in another table.

Procedure for setting a primary key

In each new table in a database , you can set one field as the primary key.

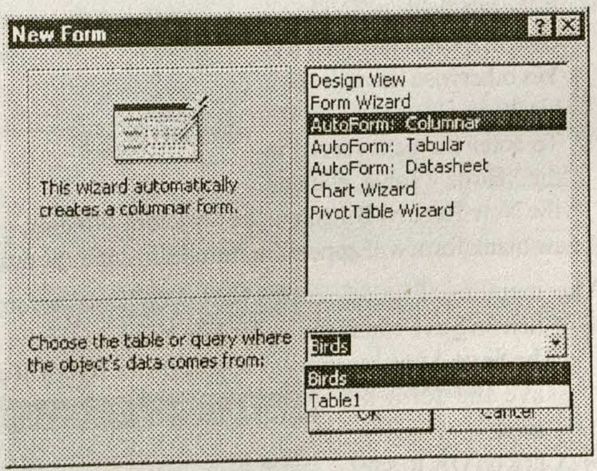
- Select the field that you want to set as primary key.
- Click on the **Primary key** button.



The field will be set as the primary key, indicating by a small key in the field of selector column. The primary key is a toggle. To remove it , select the primary key field and click on the Primary key button again.

6.8 Creating the Form

- Click on the **Forms** tab in the "BIRDLIST" database.
- Click on New.



This wizard automatically creates a columnar form.

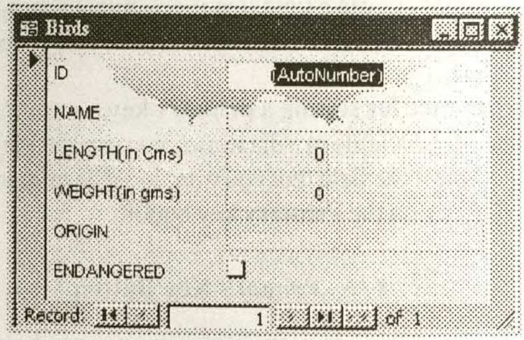
Choose the table or query where the object's data comes from:

The **New Form** dialog box will appear on the screen.

- Select the **Auto Form: Columnar** format.
- Click on the arrow next to the box in the bottom of the window. A pop down menu will appear on screen from which you have to select the desired table.
- Select the "Birds" Table.
- Click on **OK**.

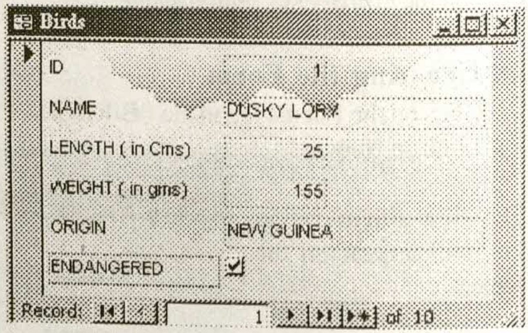
6.9 Entering Information

- Click on the **Forms** tab. To enter the first record you have to perform the following steps.
- In the NAME field, type "DUSKY LORY"
- Press the Tab key to go to the next field, LENGTH (in cms) type 25, then press Tab.



ID (AutoNumber)
NAME
LENGTH(in Cms) 0
WEIGHT(in gms) 0
ORIGIN
ENDANGERED ☐
Record: 1 of 1

- In the WEIGHT (in gms) field , type 155, then press Tab.
- In the ORIGIN field , type NEW GUINEA, then press Tab.
- In the last field i.e. ENDANGERED, Click on box if it is **Yes** otherwise leave the box blank.
- To enter the next record in the "Birds" Table, click on the **New Record Button** in the Sequence Window.

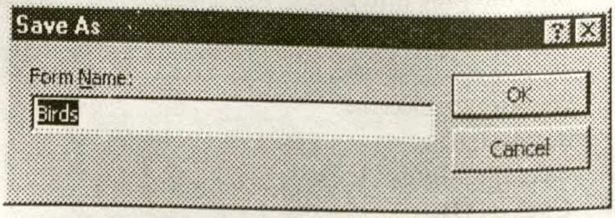


ID 1
NAME DUSKY LORY
LENGTH (in Cms) 25
WEIGHT (in gms) 155
ORIGIN NEW GUINEA
ENDANGERED ☑
Record: 1 of 10

A new blank form will appear for the user to enter the next record.

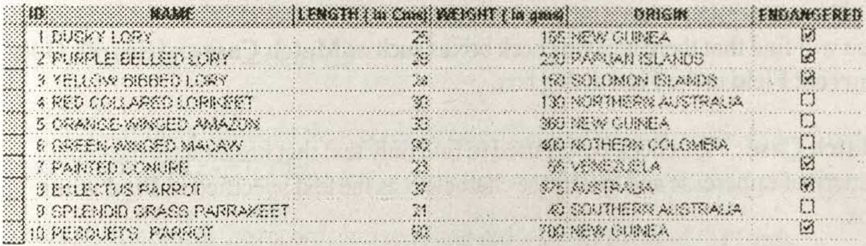
After inputting all the ten records you have to save the form.

- Click on **Save** command under **File** menu.
  The **Save As** dialog box will appear on the screen. It asks the user if he wants to save the form as "Birds".
- Click on **OK** to save the form. So, the form will be saved with a name "Birds".



Form Name: Birds

The "Birds" database table after entering the records.



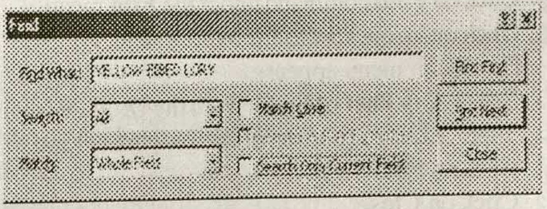
ID	NAME	LENGTH (in Cms)	WEIGHT (in gms)	ORIGIN	ENDANGERED
1	DUSKY LORY	25	155	NEW GUINEA	☑
2	PURPLE BELLIED LORY	28	220	PAPUAN ISLANDS	☑
3	YELLOW BIBBED LORY	24	150	SOLOMON ISLANDS	☑
4	RED COLLARED LORIKEET	30	130	NORTHERN AUSTRALIA	☐
5	ORANGE-WINGED AMAZON	33	360	NEW GUINEA	☐
6	GREEN-WINGED MACAW	90	400	NOTHERN COLOMBIA	☐
7	PAINTED CONURE	23	56	VENEZUELA	☑
8	ECLECTUS PARROT	37	375	AUSTRALIA	☑
9	SPLENDID GRASS PARRAKEET	21	40	SOUTHERN AUSTRALIA	☐
10	PESQUETS PARROT	60	700	NEW GUINEA	☑

6.10 Searching for a specific information

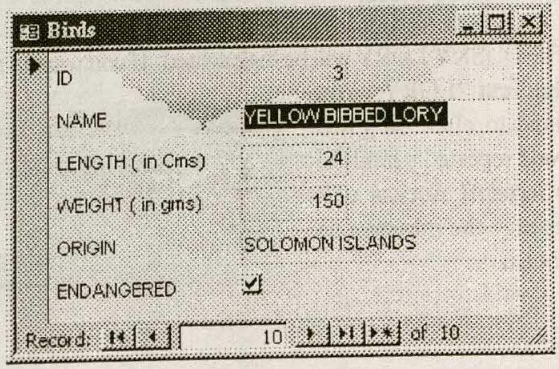
The **Find** command is a very powerful tool in Microsoft ACCESS application.It enables us to search for any information in any of the fields of a database.

It may happen that we would like to know a specific information amongst thousands of records stored in a database, in such a case it will be almost impossible to check through each record. To enable us to find any information very fast, Access provides us with **Find** tool.

In the "Birds" database table say we would like to know about the characteristics of the YELLOW BIBBED LORY. What do you do?



Find What: YELLOW BIBBED LORY



ID 3

NAME YELLOW BIBBED LORY

LENGTH (in Cms) 24

WEIGHT (in gms) 150

ORIGIN SOLOMON ISLANDS

ENDANGERED ☑

Record: 10 of 10

- ☺ Click on **Find** command under the **Edit** menu.
- ☺ Type the word "YELLOW BIBBED LORY" inside **Find What** box.
- ☺ Click on **Find First.**

The **Find First** command will find the first occurrence of the data asked for.

- ☺ Click on **Close.**

The record of YELLOW BIBBED LORY will be highlighted and you will know right where it is.

Even if your database grows to be very large you will be able to locate any bird using their name with the help of **Find** command.

You will find that there are two check boxes such as **Match Case** and **Search Only Current Field** in the **Find** dialog box.

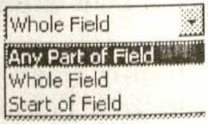
Match Case : This check box is used to find only text that has exactly the same pattern of uppercase and lowercase characters as the text specified in **Find what** box.

Search Only Current Field : This check box is used to search through all records in the current field only.

Suppose, we want to find out the name of those birds ending with LORY.
This is possible only through finding from **Any part of the Field** option instead of finding from the **Whole Field** option. This also helps us to locate a particular record even if we forget the complete name of a bird.

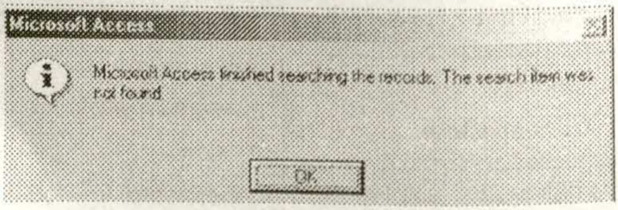
6.11 Searching for partial information

- ☺ Click on **Find** command under the **Edit** menu.
- ☺ Click on arrow next to the **Match** field.
  The Match menu appears.
- ☺ Select **Any Part of Field** from the Drop Down menu.
- ☺ Type " LORY" [Portion of the text] in the **Find What** field.
- ☺ Click on **Find First.**
- ☺ Click on **Close.**



Match menu

The DUSKY LORY will be highlighted. If you want to find out the records containing the Text "LORY" You have to click on **Find Next** repeatedly until the Microsoft Access will display the message as shown.



Microsoft Access finished searching the records. The search item was not found.

[**Find Next** : This option is used to search for the next occurrence of the text you specified in **Find What** option.]

6.12 Sorting the records

The Sort command arranges the records alphabetically either in ascending (A-Z) order or in descending (Z-A) order.

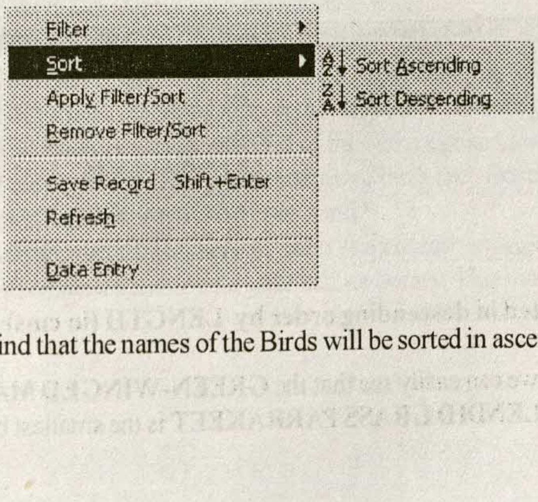
Let us try to sorting the records in ascending order by the name of the Birds.

In order to sort the records, you have to perform the following steps:

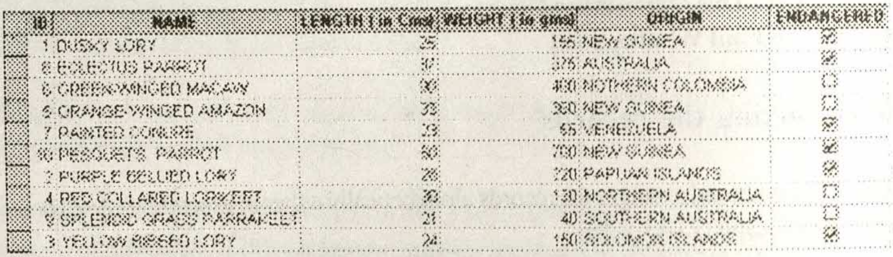
- Click on the **Table** tab in the "BIRDLIST" database.
- Open the "Birds" Table.
- Click anywhere on the Name column.
- Click on **Sort** command under **Records** menu.

It will show the two options: **Sort Ascending** and **Sort Descending.**

- Click on **Sort Ascending**



You will find that the names of the Birds will be sorted in ascending order.



ID	NAME	LENGTH (in Cms)	WEIGHT (in gms)	ORIGIN	ENDANGERED
1	DUSKY LORY	25	165	NEW GUINEA	☒
8	ECLECTUS PARROT	37	375	AUSTRALIA	☒
6	GREEN-WINGED MACAW	90	400	NOTHERN COLOMBIA	☐
5	ORANGE-WINGED AMAZON	33	360	NEW GUINEA	☐
7	PAINTED CONURE	23	55	VENEZUELA	☒
10	PESQUET'S PARROT	60	700	NEW GUINEA	☒
2	PURPLE BELLIED LORY	26	220	PAPUAN ISLANDS	☒
4	RED COLLARED LORIKEET	30	130	NORTHERN AUSTRALIA	☐
9	SPLENDID GRASS PARRAKEET	21	40	SOUTHERN AUSTRALIA	☐
3	YELLOW BIBBED LORY	24	150	SOLOMON ISLANDS	☒

Records sorted in ascending order by NAME of the birds.

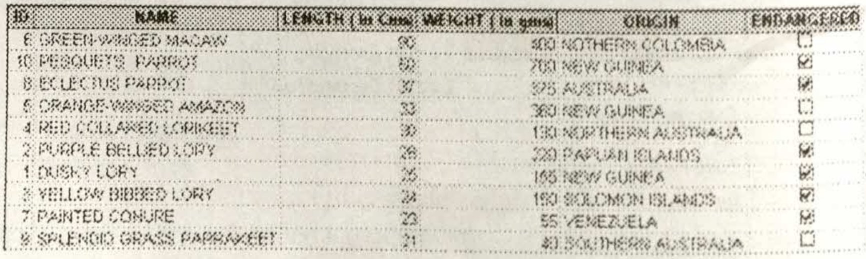
We can also sort on numeric fields.
Say, you want to find out which is the longest and smallest bird in this database.
In order to do that we have to perform the following steps:

- ☺ Click on the Table tab.
- ☺ Open the "Birds" Table.
- ☺ Click anywhere in LENGTH (in cms) column.
- ☺ Click on **Sort** command under **Records** menu.

It will show the two options: **Sort Ascending** and **Sort Descending**

- ☺ Click on **Sort Descending**

The following sorted table will appear on the screen.



ID	NAME	LENGTH (in Cms)	WEIGHT (in gms)	ORIGIN	ENDANGERED
6	GREEN-WINGED MACAW	90	400	NOTHERN COLOMBIA	☐
10	PESQUET'S PARROT	60	700	NEW GUINEA	☒
8	ECLECTUS PARROT	37	375	AUSTRALIA	☒
5	ORANGE-WINGED AMAZON	33	360	NEW GUINEA	☐
4	RED COLLARED LORIKEET	30	130	NORTHERN AUSTRALIA	☐
2	PURPLE BELLIED LORY	26	220	PAPUAN ISLANDS	☒
1	DUSKY LORY	25	165	NEW GUINEA	☒
3	YELLOW BIBBED LORY	24	150	SOLOMON ISLANDS	☒
7	PAINTED CONURE	23	55	VENEZUELA	☒
9	SPLENDID GRASS PARRAKEET	21	40	SOUTHERN AUSTRALIA	☐

Records sorted in descending order by LENGTH (in cms)

From this sorted table, we can easily see that the **GREEN-WINGED MACAW** is the longest bird and **SPLENDID GRASS PARRAKEET** is the smallest bird in the above database.

Do it yourself

1. Can you find out the heaviest and lightest bird in the BIRDLIST database above?
2. Create a database of your classmates with the following fields:

Name :
Age :
Address :
Telephone:
Height :
Date of Birth :
Blood Group :
Hobby :
Has younger brother(s):
[Yes/No]

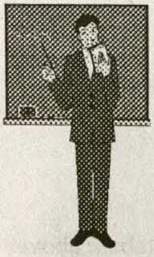
Find out the student who is the tallest in class
Find out the student who is the shortest in class
Find out those students whose blood group matches with yours.
Find out those students who do not have any brother.
Find out those students who are of the same age as yours.
Find out those students whose month of birth are "December" or "October"

3. What is the function of Sort command?
4. Which are the areas where you can use a database?
5. Try to create a database for your school library. This may contain more than one table.

Chapter :7

Multimedia Operations

We will learn about



- ☺ **Multimedia today**
- ☺ **Components of a multimedia system**
- ☺ **How does the system work?**
- ☺ **Why do we need multimedia?**
- ☺ **Uses of Multimedia**
- ☺ **Advantages of Multimedia**
- ☺ **Installing software from multimedia CDROMs**
- ☺ **What are CBTs ?**
- ☺ **Where is multimedia learning used?**

7.1 Multimedia today

Multimedia applications are designed as multisensory experiences and are primarily based on graphic presentations. Graphics are key building blocks for Multimedia applications. Graphics form the visual elements that supplement to make printed message more clear or interesting. Multimedia information systems make use of many different types of medium. These include text, record-based data, numeric data, graphics, image, voice and video. Several applications are multimedia based, in the sense that they use more than one of these forms.

For example, although word processor applications supports both text and graphics it will not be termed as a multimedia application. The term 'multimedia' is generally used, to describe more sophisticated computer systems, particularly those that support moving images and audio.

7.2 Components of a multimedia system

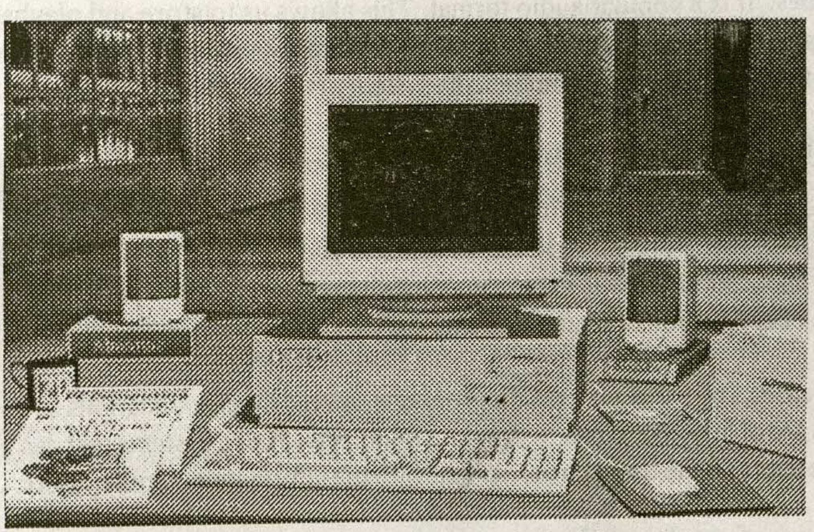
A multimedia system combines elements that are familiar from the worlds of film, video, broadcast television, music and telecommunications as well as computing. Some of the main components of a multimedia system are :

- ☺ A processor, typically a personal computer or workstation that has been enhanced to handle audio and video functions.
- ☺ More than one input device like scanners, light-pens, apart from keyboard and mouse.

- A screen that can display high quality images, both still and moving video.
- Speakers to allow speech and music output.
- A microphone/headphone

7.3 How does the system work?

The individual parts of the multimedia system cannot work on their own. All these combined together work as a complete system. In order to use multimedia on a computer system, some of the most important components required are shown in the illustration below:



A multimedia based system must perform three basic functions:

- Taking input of data from sources like pictures or video camera or from musical instruments like a synthesizer.
- Using a multimedia application program like PowerPoint, 3D Studio, Animator Pro, Scala, Macromedia Director etc. to combine the data like text, sound and video.
- An output media like CD-ROM, to store the final multimedia production.

The main difference between an ordinary computer system and a multimedia based system is the nature of data. Ordinary computer systems use files consisting of data that the computer can handle with application software like word processors, spreadsheet applications or database management systems.

Multimedia data in contrast consists of large files that contain images, video or audio. All these files must be handled together using a particular multimedia development program.

Some of the most frequently used technologies of multimedia are :

Video for Windows : This is a special type of file format that allows us to store audio and video together.It uses a popular file format (AVI-Audio / Video Interleave) that can be used on most of the Windows based PCs.

QuickTime: This is another file format for storing audio and video together. This was developed by Apple. This can be used on both Apple and IBM PCs.

Wave files: It is a popular audio format. This allows us to store and playback CD quality audio recorded through an input device like a synthesiser. Wave (WAV) files are mostly used on Windows multimedia systems.

7.4 Why do we need multimedia?

We are using data all the time. It is around us in all forms, like numbers, figures, dates, logical true/false, alphanumeric etc. In order to process the data, we have different types of application software. But sometimes it becomes necessary to create a different type of application that interacts with the user in a more user-friendly way.

In such cases, the word processing programs, spreadsheet applications or database systems are of little use. Thus, we require multimedia based systems that can interact with the user and the user can participate with the information of other users.

7.5 Uses of multimedia

Imagine you have to talk to your father who has gone abroad. The most common method would be to use the telephone. But in today's world, with the multimedia computers available, we can have a video-conferencing over huge distances. So, you can, not only talk but see your father while talking. Thus is becames enjoyable for the users to operate through Video Conferencing.

Multimedia can also be used in homes. For example, one can take a virtual safari of Africa, by watching a virtual reality based CD-ROM. One can also browse through a multimedia encyclopaedia instead of reading ten or twenty volumes of it.

Multimedia can also play an important role, where a group of people need to share information. With the use of multimedia based groupware software, many people can share related information and when one is changed, it is shown in all other machines. Some of the other field where we use multimedia are:

- ☺ Medicine
- ☺ Training
- ☺ Sales
- ☺ Communication

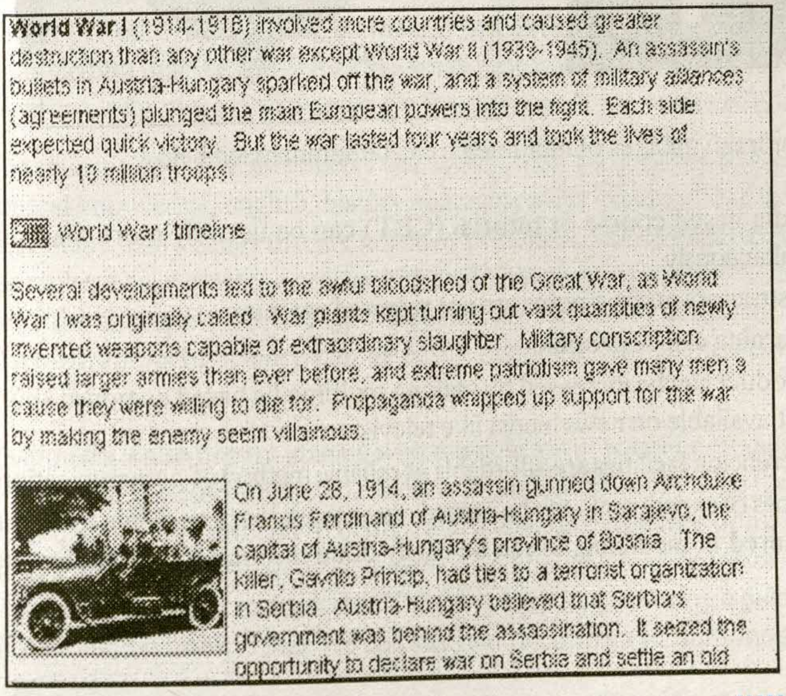
7.6 Advantages of multimedia

With the technological advancements made everyday, multimedia has undergone a lot of changes. It has been observed that people often learn and retain more than an interactive learning than the canventional class room teaching with an instructor and writing board.

Since what we learn in the classrooms is non-interactive, we are not able to retain most of it and need to go through the text, now-and-then to memorise the subjects.

If we use multimedia based interactive training, then it is possible to remember most of the things we learn. Some of the most frequently used multimedia based tutorials are related to science, mathematics, history, geography even the English language.

See the picture below. It demonstrates the use of multimedia very clearly.

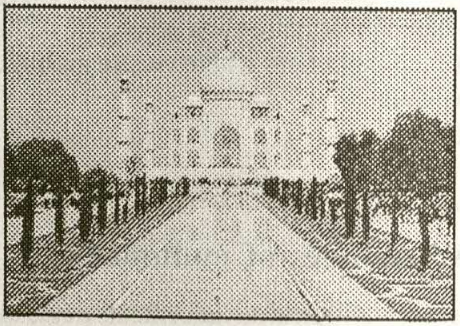


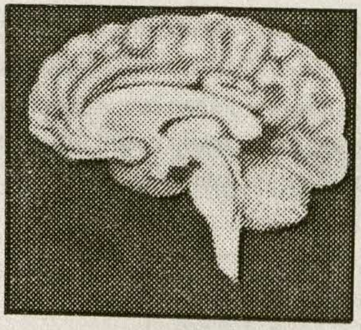
World War I (1914-1918) involved more countries and caused greater destruction than any other war except World War II (1939-1945). An assassin's bullets in Austria-Hungary sparked off the war, and a system of military alliances (agreements) plunged the main European powers into the fight. Each side expected quick victory. But the war lasted four years and took the lives of nearly 10 million troops.

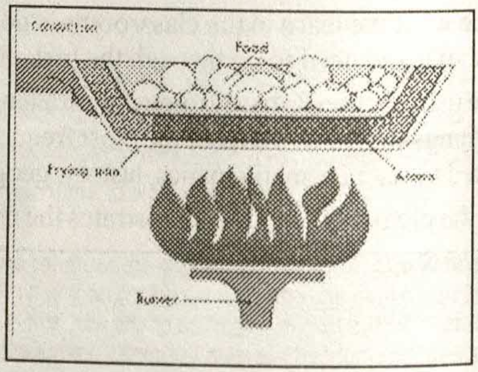
World War I timeline

Several developments led to the awful bloodshed of the Great War, as World War I was originally called. War plants kept turning out vast quantities of newly invented weapons capable of extraordinary slaughter. Military conscription raised larger armies than ever before, and extreme patriotism gave many men a cause they were willing to die for. Propaganda whipped up support for the war by making the enemy seem villainous.

On June 28, 1914, an assassin gunned down Archduke Francis Ferdinand of Austria-Hungary in Sarajevo, the capital of Austria-Hungary's province of Bosnia. The killer, Gavrilo Princip, had ties to a terrorist organization in Serbia. Austria-Hungary believed that Serbia's government was behind the assassination. It seized the opportunity to declare war on Serbia and settle an old







Some of the major advantages of multimedia can be summarised below.

- A multimedia based course or tutorial (CBT) can be used by more than one person simultaneously
- Full time instructors in classrooms are not required anymore
- Distance learning can be possible
- Sale of a product can be increased by making multimedia based demonstrations of a product available on news media like television
- Video conferencing facilities are affordable as reliable method of communication,
- Different types of experiments can be carried out without the need of live specimen, mostly required in medicine. It can be easily done through virtual reality and multimedia.

7.7 What are CBTs ?

CBTs stand for '**Computer Based Tutorials**". The use of CBTs in learning has become very popular. The ease of use and the information provided within the CDROMs are worth many books.

CBTs provide the user with a step-by-step approach to solve a problem or to explore a topic. The CBTs are hugely dependent on multimedia especially animation, graphics and sound. The demonstration of a CBT will show that it can make very uninteresting things lively and interesting for the user. For example, many people do not like to read difficult subjects like Physics, Chemistry, Anatomy, Maths etc.

But, with the CBTs available in the market these days, it is possible to create a larger interest amongst the children on these subjects with the presentation of the difficult things by use of examples from day to day activities and interactiveness with the software.

What are the advantages of using CBTs ? We all know that, the amount of information retained by reading a book declines with the days. Also, the brain cannot remember things that we cannot visualise easily. Thus, if it was possible to see and hear all the things we read, it would be easy for us to remember and retain the information for a longer period of time. Thus, by the use of CBTs, we can increase the information (knowledge) that we can gather in a small time frame. Moreover, the ease of use and benefits are far more than that we get from conventional modes of education.

The educational CDROMs mainly deal with general subjects like science, mathematics, general knowledge, english, history and many more. These CDROMs are helpful to understand many things that are normally present in classroom textbooks. Since, they use multimedia it creates a greater impact on learning and hence we can remember the same for a longer time. Many, things that are not easily understood like practical demonstrations of science can be easily understood with the help of multimedia CDROMs.

Multimedia is also used in training where simulation of scientific modelling are required for example in understanding chemical reactions, in understanding the weather and in medicine. It is very difficult to understand images in two dimensions, but very easy to understand the same with three dimensional images. Imagine visualizing the galaxy from outer space in a multimedia CDROM compared to seeing a picture of the milky way in the text book. Thus, we can say that the impact of multimedia in learning is huge.

7.8 Where is multimedia learning used?

Multimedia can be used in all areas of education and entertainment. A new term has been coined to describe it better as "edutainment".

Hence, we can say that multimedia training is not only education but also entertainment, or to put in a different way, we can say education through entertainment is edutainment. In the market, multimedia based CDROMs are available for mostly all subjects and topics conceivable.

7.9 Components of multimedia

A multimedia application has the following aspects :

- ☺ **Animation**
- ☺ **Video**
- ☺ **Graphics**
- ☺ **Audio**

Animation: This is an imporant part of multimedia. It is a very simple process. As kids we have all seen the flipbook animations. The same priciples are used in computer animations. There are a sequence of changing images which change so quickly that it gives us an impression of a moving picture. Since these images very fast, our eyes cannot differentiate the individual images.

In computer based animations, the images move according to a particular sequence and a fixed time interval. The position of the images change with time which looks as if the images are moving. We can create complex 2-D and 3-D animations with the help of computers and using animation programs like 3D Studio.

Another interesting aspect of animation is virutal reality. What does virtual reality mean? It is a term that is used to describe an enviroment that is generated by the computer in such a fashion that the user can move around in this virtually created world just like in real life. These animations are so powerful that one feels that the surrounding around the person is real.

Video : Video is another important component in a multimedia application. It is similar to an animation, the only difference being that it also contains sound. A video actually is a sequence of images and sound. Each individual image with sound is called a 'Frame'. The computer generates about 30 frames per second (fps) that seems like a movie to our eyes. There are many types of computer video types that are used in PCs. Some of the most popular file formats are the QuickTime format from Apple and the AVI format from MicroSoft. These two types of files are widely used to create and present movies or video both for the PC and also on the internet.

Graphics : We have all seen those beautiful picutres that are created by the computer. These colourful pictures or graphics makes a multimedia application more interesting and presentable. There are many programs available today for creating interesting pictures. Some of the popular programs available are Adobe Photoshop, MicroSoft Photodraw, Paint Shop Pro, CorelDraw and others.

All these applications contain features of creating and manipulating the files. Since there are different ways a file can be stored, there are many popular image formats for storing files. The most frequently used ones are **BMP** (Windows Bitmap), **GIF** (Graphics Interchange Format), **JPEG** (Joint Photographic Experts Group), **PNG** (Portable Network Graphics) and many others. All these are also widely supported on the internet, which has also increased their popularity. These file formats are mostly similar, the only difference is how they store the image (compression, and colour depth) in each format. A same bitmap (BMP) image is smaller in size compared to a JPEG image.

Audio : As we have seen that movies contain sound and images, and animations only images, the audio files contain only sound. These sounds can be either digitised i.e. taken from a digital equipment connected to the computer or it can be created with the help of a computer itself. As with file formats, there are many differnt types of sound file formats available according to the data that is stored in those files. Some of the popular file formats are **WAV** (Wave files), **MIDI** (MIDI files), **RA** (RealAudio) and many others. These files are also popular files formats for the internet, but the WAV files are usually avoided since they tend be very large in size. A new and very popular file format MP3 (MPEG Audio-Layer 3) which promises to deliver CD quality audio for the PC. It has been seen that a 1:10 compression is achieved when a WAV file is converted to a MP3.

Another difference from the MIDI file and other files is the information stored in the files. Since a MIDI file contains instructions for the comptuer to play a particular digital instrument available in the audio bank of the sound board, they can contain large amount of information in a very short file, whereas a similar quality WAV files will take a lot of space and will not be of the same quality.

Chapter :8
Internet

We will learn about

- ☺ **Introduction to Internet**
- ☺ **Uses of Internet**
- ☺ **Connecting to the Internet**
- ☺ **Browsing**
- ☺ **HTML**

8.1 Introduction

Internet is one of the largest computer networks spanning the entire globe. Before we understand how to use the Internet, let us learn a few things about computer networks.

A computer network is an interconnection of two or more computers and devices to share resources between them. A network can consist of a few computers in a small room, to large computer networks across cities. These networks are given names according to the area covered by them. The smallest networks are called **Local Area Networks** or **LAN**s. A little bigger network that is spread across cities is called **Metropolitan Area Network** or **MAN**. The largest network that are connected across different countries or even continents is called **Wide Area Networks** or WANs.

The Internet does not fall under any of the above particular types of network. It is actually a combination of all the above types of the networks. It is so large in size that it has been given the special name '**Information Superhighway**'.

How do computers communicate with each other? When one computer is connected to another computer, both the computers must know how to communicate with each other in order to exchange information. Thus a set of rules have been defined for computers to communicate with each other, called **protocols**. Therefore, all computer networks have to follow a particular protocol so that data can be shared or interchanged amongst different computers.

The most commonly used protocol for the Internet is TCP/IP or **Transmission Control Protocol / Internet Protocol**. This protocol helps the computers on the Internet to share information. It also acts as a translator for domain names and IP addresses (discussed later).

The Internet across the globe is used in two areas (i) Viewing various sites under the World Wide Web (ii) Operating Electronic Mail, from where one can send and receive mails.

8.2 Uses of the Internet

Let us see some of the features and uses of the Internet below:

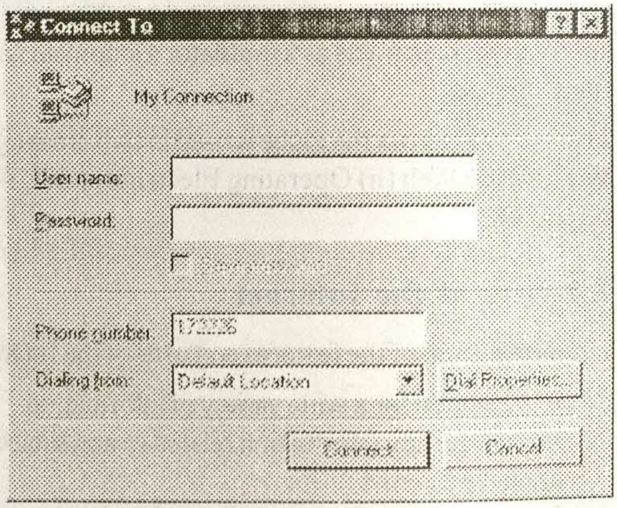
- ☺ It is a source for a wide variety of information.
- ☺ We can get any information related to any subject by sitting on our computer and using the Internet.
- ☺ Different types of news, information that cannot be found in books, magazines etc. can be downloaded from the Internet.
- ☺ Most of the day-to-day requirements of shopping, buying and selling of goods can now be done in the comfort of our house without having to go out to do the same.
- ☺ Internet is also a learning medium. We can undertake different educational courses that are usually not available, in conventional classrooms. We can also complete the courses at our own leisure.
- ☺ The biggest advantage of the Internet is that it is probably the most inexpensive medium of communication. We can send almost instantly any document (mail) to our friends, relatives or colleagues to any corner of the world, if one has a computer and an Internet connection. This is called **e-mail** (electronic mail).

8.3 Connecting to the Internet

To connect to the Internet, we need the following equipment:

- ✓ A modem
- ✓ A telephone connection
- ✓ Internet account from an Internet Service Provider (ISP)
- ✓ Internet browser to see the information from the Internet
- ✓ An e-mail client (a program that connects to the server to download e-mails) to send and receive emails

Now, let us try to connect to the Internet. Click on **My Computer** | Double-click on **Dial-up Networking** and then double click on **My Connection** (or any other connection).



You will find the **Connect To** dialog box will appear on the screen.

You can click on the **Connect** button to get connected. After getting connected, you are asked to enter your username (given by your ISP) and the password. After successfully entering the information, we are connected to the Internet.

After connection, we can browse the net and send e-mails.

8.4 Browsing

Viewing information on the Internet using a special program called 'Browser' is called '**Browsing**'. The actual English meaning of the word is 'see or leaf through' like the pages of the book. By Internet browsing, we mean 'viewing' the pages related to a particular subject.

Since, the Internet is a huge warehouse of information, all information is usually stored in a systematic way in pages. A collection of similar pages is called a **site**. These sites are created or owned by individuals or by companies.

Since, it is difficult to remember where and how these pages are stored and accessed, the Internet uses a very simple (apparently) method. It gives a symbolic name to these sites (or web-sites) called "domain names".

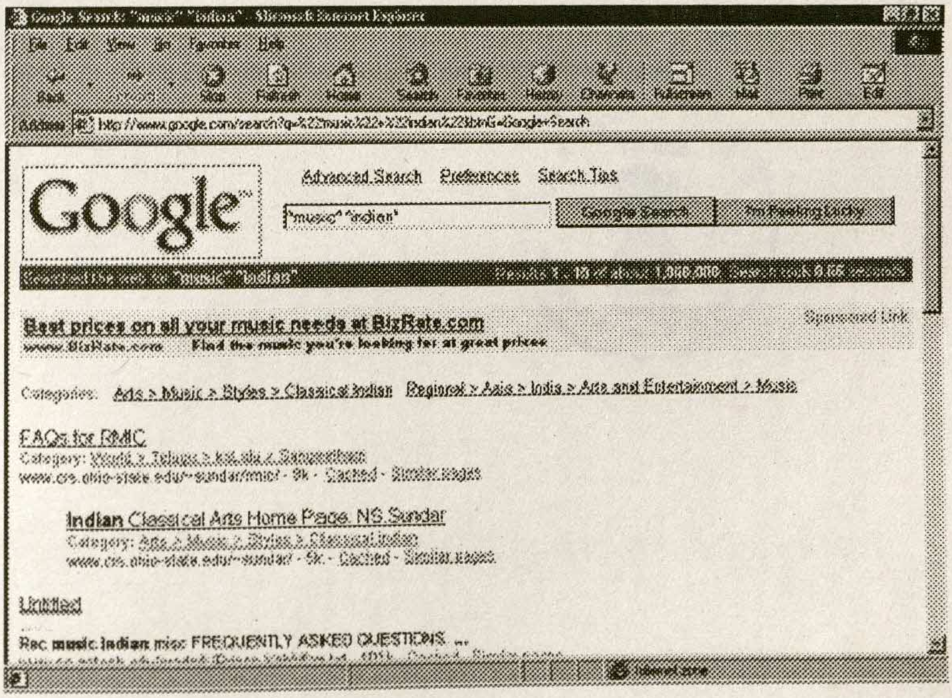
In practice, it is actually a number like 202.54.197.114 (called the IP address) that represents a particular site. The IP protocol translates these addresses to its symbolic names. Each domain name has three parts. For example "**http://www.yahoo.com**", has actually three parts. The address or first part or "www" means it is a part of the world wide web, the second part "yahoo" is the actual name of the site and names "com" denotes that is a commercial (business) site.

The last part (com) can be any of the following names, "edu" meaning an educational site (or related to education), "org" usually used by non-profit making organisations, "mil" or "gov" used by military or governmental agencies.

The "http" at the beginning of the address tells the browser to use the **HTTP (Hyper Text Transfer Protocol)** to access and display the web-site.

Also we can search the Internet for web-pages or sites for a particular subject. We search with special sites called '**search engines**'. These sites keep an index of all pages of the Internet and keeps a track of their contents. Thus, when we request for a word, or phrase of text, it quickly searches the web, and displays all those pages containing our search. One of the most popular search engines is "Google". This search engine contains a list of more than 100 million different web pages.

In the picture, we see the web-site of Google.com. We can enter a few words and click on the **Search** button. Yahoo then hunts the Internet and displays all those pages that contain the results of our search. Here we have searched the Internet for "Indian music" and the first few results are displayed from the 10 million pages found.



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